US007006605B1

(12) **United States Patent**
Morganstein et al.

(10) **Patent No.: US 7,006,605 B1**
(45) **Date of Patent: *Feb. 28, 2006**

(54) **AUTHENTICATING A CALLER BEFORE PROVIDING THE CALLER WITH ACCESS TO ONE OR MORE SECURED RESOURCES**

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(73) Assignee: **Ochopee Big Cypress LLC**, Los Altos, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 287 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/352,848**

(22) Filed: **Jan. 27, 2003**

Related U.S. Application Data

(63) Continuation of application No. 09/799,977, filed on Mar. 2, 2001, now Pat. No. 6,526,126, which is a continuation of application No. 08/982,190, filed on Dec. 17, 1997, now Pat. No. 6,205,204, which is a continuation-in-part of application No. 08/672,677, filed on Jun. 28, 1996, now Pat. No. 5,940,476, and a continuation-in-part of application No. 08/819,482, filed on Mar. 17, 1997, now Pat. No. 5,901,203, and a continuation-in-part of application No. 08/918,937, filed on Aug. 25, 1997, now Pat. No. 6,529,881.

(51) **Int. Cl.**
H04M 1/64 (2006.01)
H04M 11/00 (2006.01)

(52) **U.S. Cl.** **379/88.02**; 379/88.01; 379/88.03; 379/88.04; 379/88.19; 379/88.2; 379/88.21

(58) **Field of Classification Search** 379/88.02, 379/88.03, 88.04, 93.03, 127.02, 142.05, 379/201.11, 88.19, 88.2, 88.21, 67.1
See application file for complete search history.

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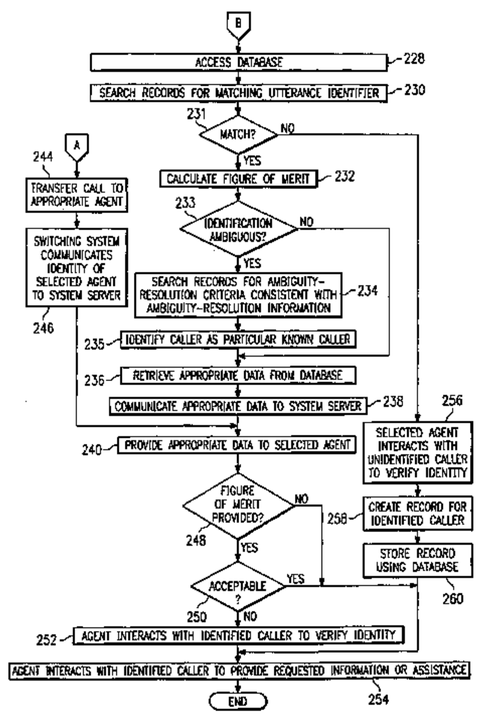
Primary Examiner—Allan Hoosain
(74) *Attorney, Agent, or Firm*—Sterne, Kessler, Goldstein & Fox P.L.L.C.

(57) **ABSTRACT**

In one embodiment, a system authenticates a caller before providing the caller with access to one or more secured resources. Identification and verification data is stored during system enrollment of known persons. A processing system, in a current call initiated by a caller and prior to identification of the caller, receives voice-based information for the caller including a digital representation of a telephone number spoken by the caller in the current call, the received information including voice-based identification information and voice-based verification information for the caller. The processing system automatically compares the received identification information and the received verification information for the caller with the stored identification and verification data for known persons, respectively, to uniquely identify and verify the identity of the caller as a particular known person. The processing system authenticates the caller for access to the one or more secured resources in response.

32 Claims, 16 Drawing Sheets



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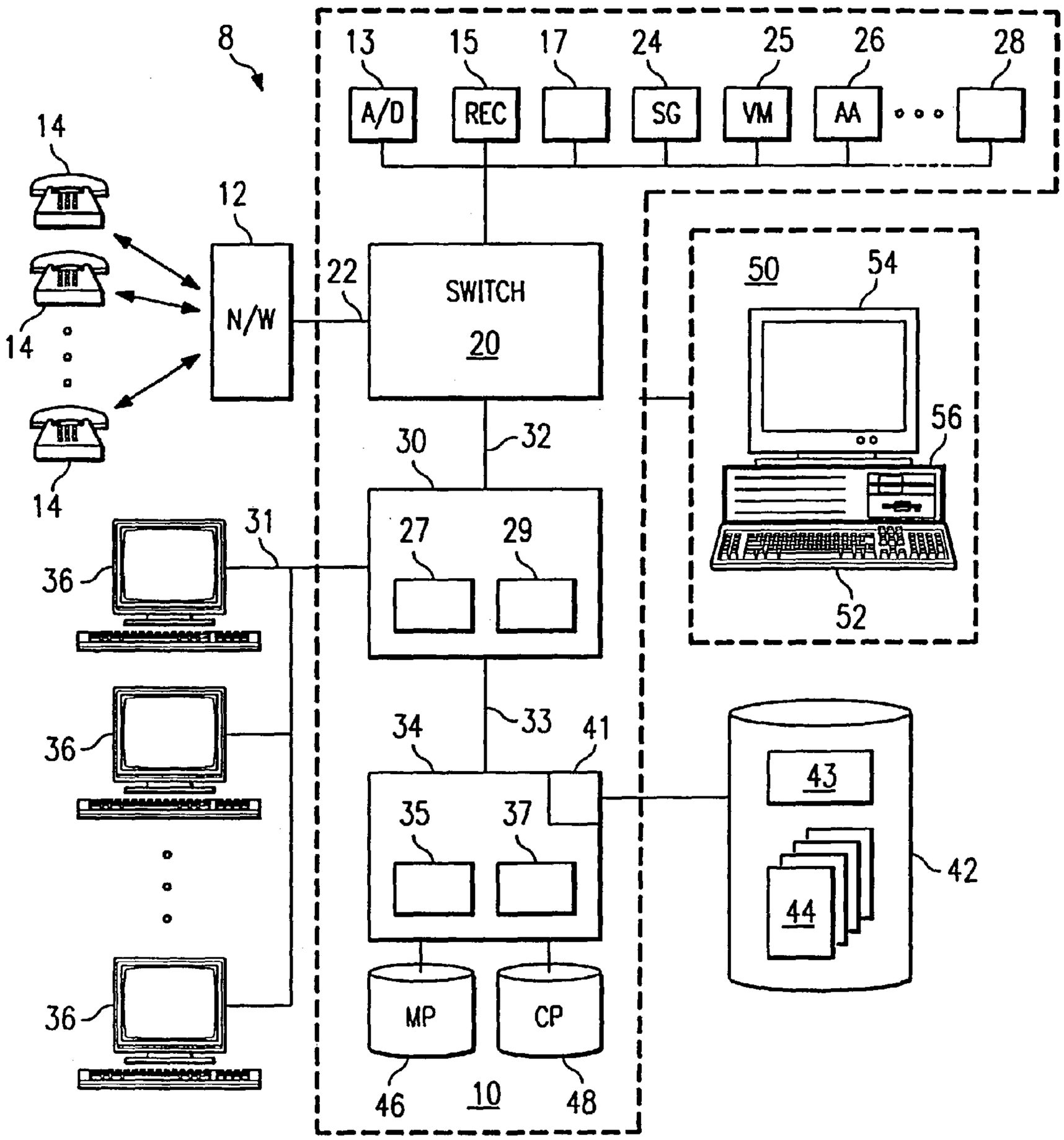
8
13
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17
24
25
26
28
A/D
REC
SG
VM
AA
14
12
N/W
22
SWITCH
20
50
54
56
52
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37
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42
44
MP
CP
46
10
48

FIG. 1

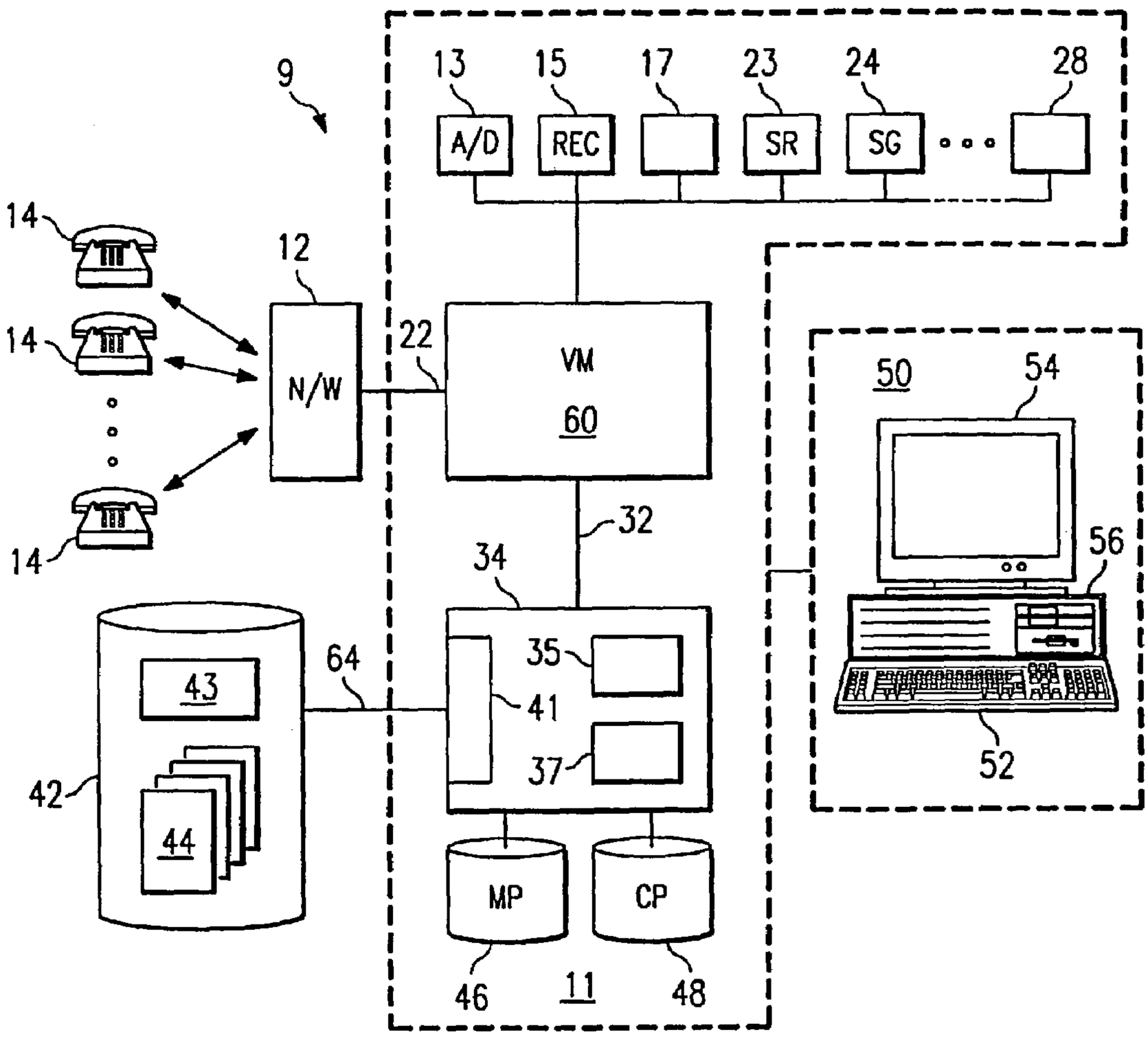

9
13
15
17
23
24
28
A/D
REC
SR
SG
14
14
14
12
N/W
22
VM
60
50
54
56
52
32
34
64
35
41
37
43
42
44
MP
CP
46
11
48

FIG. 2

100

	102 ACCOUNT ID	106 LAST NAME	108 GENDER	110 ADDRESS	112 RESIDENCE	114 COMMUNICATIONS	116 ORGANIZATION	118 SBU	119 PREMISES	120 CLEARANCE	121 HISTORY	...
44	J4N055	SMITH	M	21 ELM	DALLAS	(214) 555-8675	XYZ	62	17	—	HUGGIES	
44	T3Q864	HILL	M	3 MAPLE	DENVER	555	ACME	13	DENVER-2	—	$1231.65	
44	L2T475	PARK	F	54 OAK	MIAMI	PARK@ABC.COM	ABC	32	HHS-ELM	7	12/2/96	
	...											

104

FIG. 3a

130

	102 ACCOUNT ID	134 ORDER	136 DATE	138 PART	140 MANUFACTURER	142 SERIAL	144 PURCHASE	146 STATUS	...
44	J4N055	3221	05/22/96	43NN	JONES, INC.	339VM	$295.00	C	
44	T3Q864	4784	05/25/96	J37S	HARRIS, INC.	4273X0	$17.00	D	
44	T3Q864	4785	05/25/96	XY;7P	AONE, INC.; XYZ	— ;330TVN	$42.00; $1,312.00	D	
44	L2T475	7263	06/01/96	3907	AOK CO.	—		O	
	...								

132

FIG. 3b

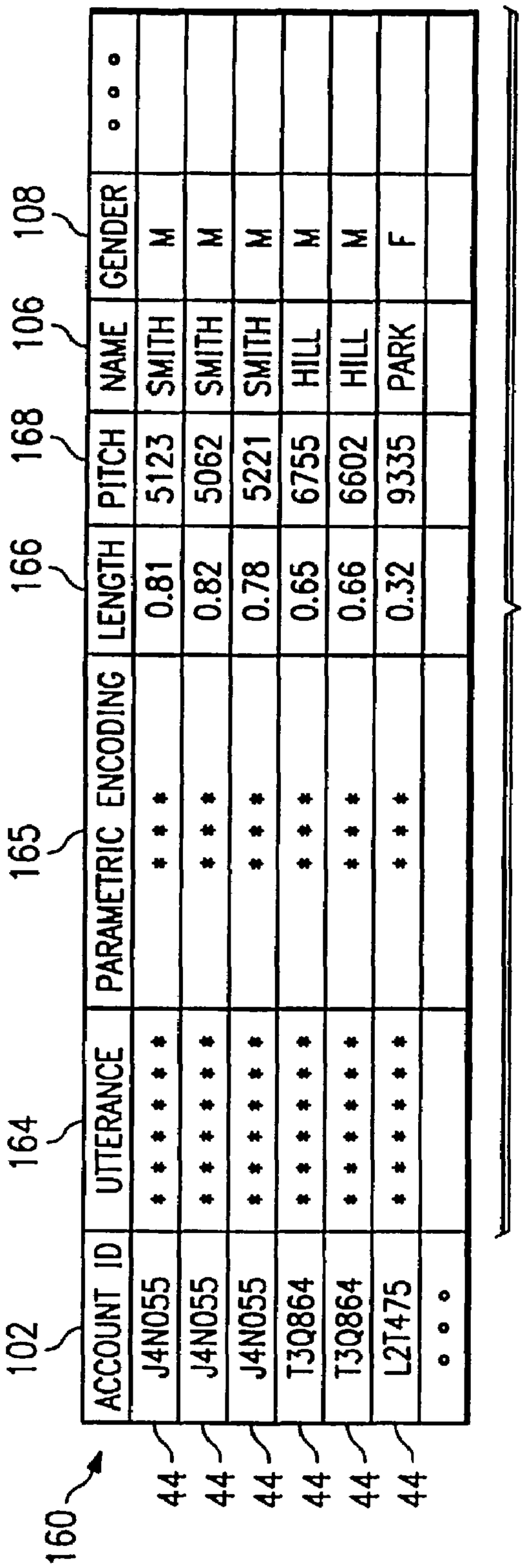

160
102
ACCOUNT ID
164
UTTERANCE
165
PARAMETRIC ENCODING
166
LENGTH
168
PITCH
106
NAME
108
GENDER
J4N055 * * * * * * * 0.81 5123 SMITH M
J4N055 * * * * * * * 0.82 5062 SMITH M
J4N055 * * * * * * * 0.78 5221 SMITH M
T3Q864 * * * * * * * 0.65 6755 HILL M
T3Q864 * * * * * * * 0.66 6602 HILL M
L2T475 * * * * * * * 0.32 9335 PARK F
44
162

FIG. 3c

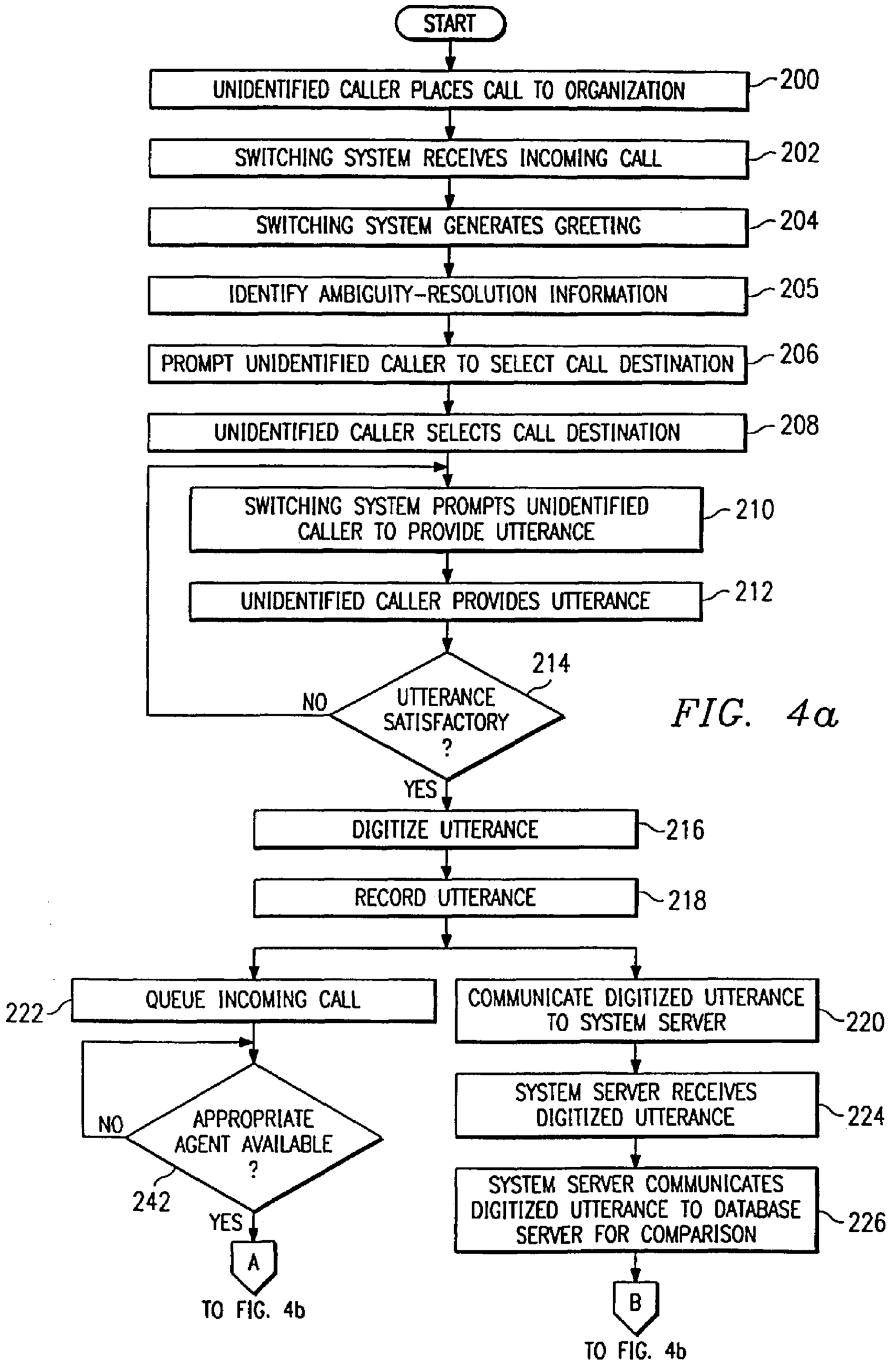

START
UNIDENTIFIED CALLER PLACES CALL TO ORGANIZATION
200
SWITCHING SYSTEM RECEIVES INCOMING CALL
202
SWITCHING SYSTEM GENERATES GREETING
204
IDENTIFY AMBIGUITY-RESOLUTION INFORMATION
205
PROMPT UNIDENTIFIED CALLER TO SELECT CALL DESTINATION
206
UNIDENTIFIED CALLER SELECTS CALL DESTINATION
208
SWITCHING SYSTEM PROMPTS UNIDENTIFIED CALLER TO PROVIDE UTTERANCE
210
UNIDENTIFIED CALLER PROVIDES UTTERANCE
212
214
UTTERANCE SATISFACTORY ?
NO
YES
DIGITIZE UTTERANCE
216
RECORD UTTERANCE
218
QUEUE INCOMING CALL
222
COMMUNICATE DIGITIZED UTTERANCE TO SYSTEM SERVER
220
APPROPRIATE AGENT AVAILABLE ?
NO
242
YES
A
TO FIG. 4b
SYSTEM SERVER RECEIVES DIGITIZED UTTERANCE
224
SYSTEM SERVER COMMUNICATES DIGITIZED UTTERANCE TO DATABASE SERVER FOR COMPARISON
226
B
TO FIG. 4b

FIG. 4a

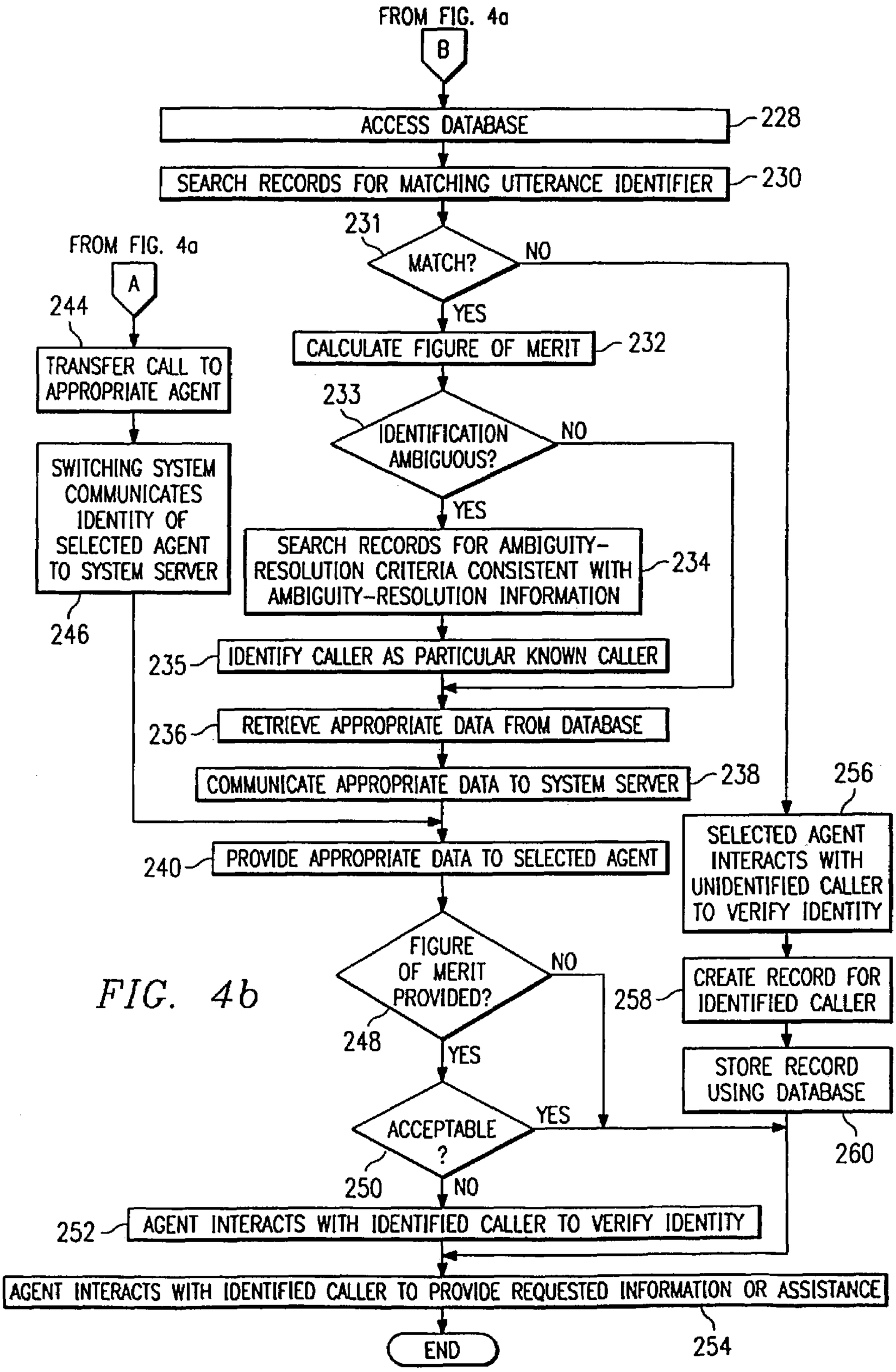

FROM FIG. 4a
B
ACCESS DATABASE
228
SEARCH RECORDS FOR MATCHING UTTERANCE IDENTIFIER
230
231
MATCH?
NO
YES
FROM FIG. 4a
A
244
CALCULATE FIGURE OF MERIT
232
TRANSFER CALL TO APPROPRIATE AGENT
233
IDENTIFICATION AMBIGUOUS?
NO
YES
SWITCHING SYSTEM COMMUNICATES IDENTITY OF SELECTED AGENT TO SYSTEM SERVER
246
SEARCH RECORDS FOR AMBIGUITY-RESOLUTION CRITERIA CONSISTENT WITH AMBIGUITY-RESOLUTION INFORMATION
234
235
IDENTIFY CALLER AS PARTICULAR KNOWN CALLER
236
RETRIEVE APPROPRIATE DATA FROM DATABASE
COMMUNICATE APPROPRIATE DATA TO SYSTEM SERVER
238
256
240
PROVIDE APPROPRIATE DATA TO SELECTED AGENT
SELECTED AGENT INTERACTS WITH UNIDENTIFIED CALLER TO VERIFY IDENTITY
FIGURE OF MERIT PROVIDED?
NO
258
CREATE RECORD FOR IDENTIFIED CALLER
248
YES
STORE RECORD USING DATABASE
ACCEPTABLE ?
YES
260
250
NO
252
AGENT INTERACTS WITH IDENTIFIED CALLER TO VERIFY IDENTITY
AGENT INTERACTS WITH IDENTIFIED CALLER TO PROVIDE REQUESTED INFORMATION OR ASSISTANCE
254
END

FIG. 4b

FIG. 5a

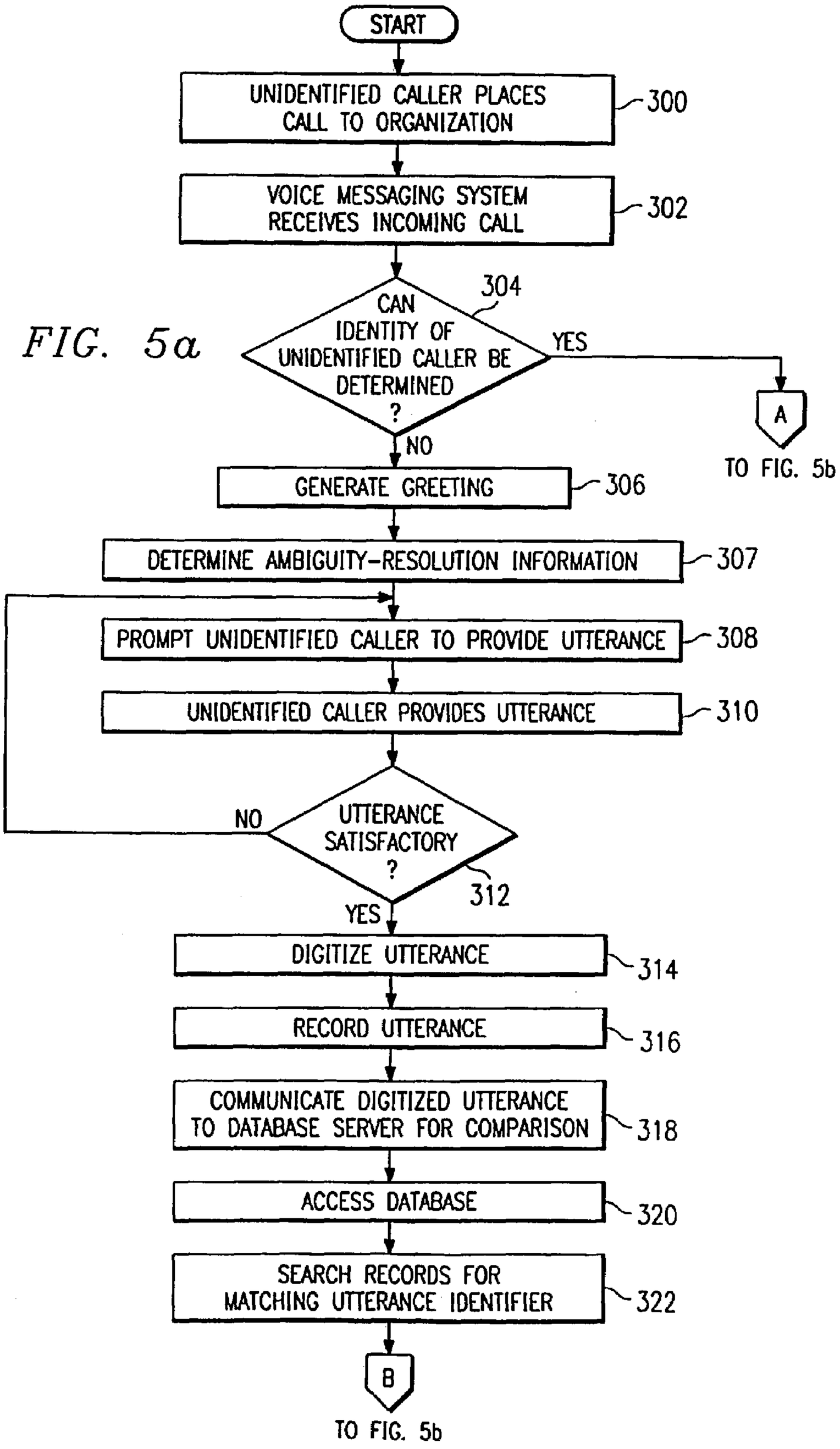
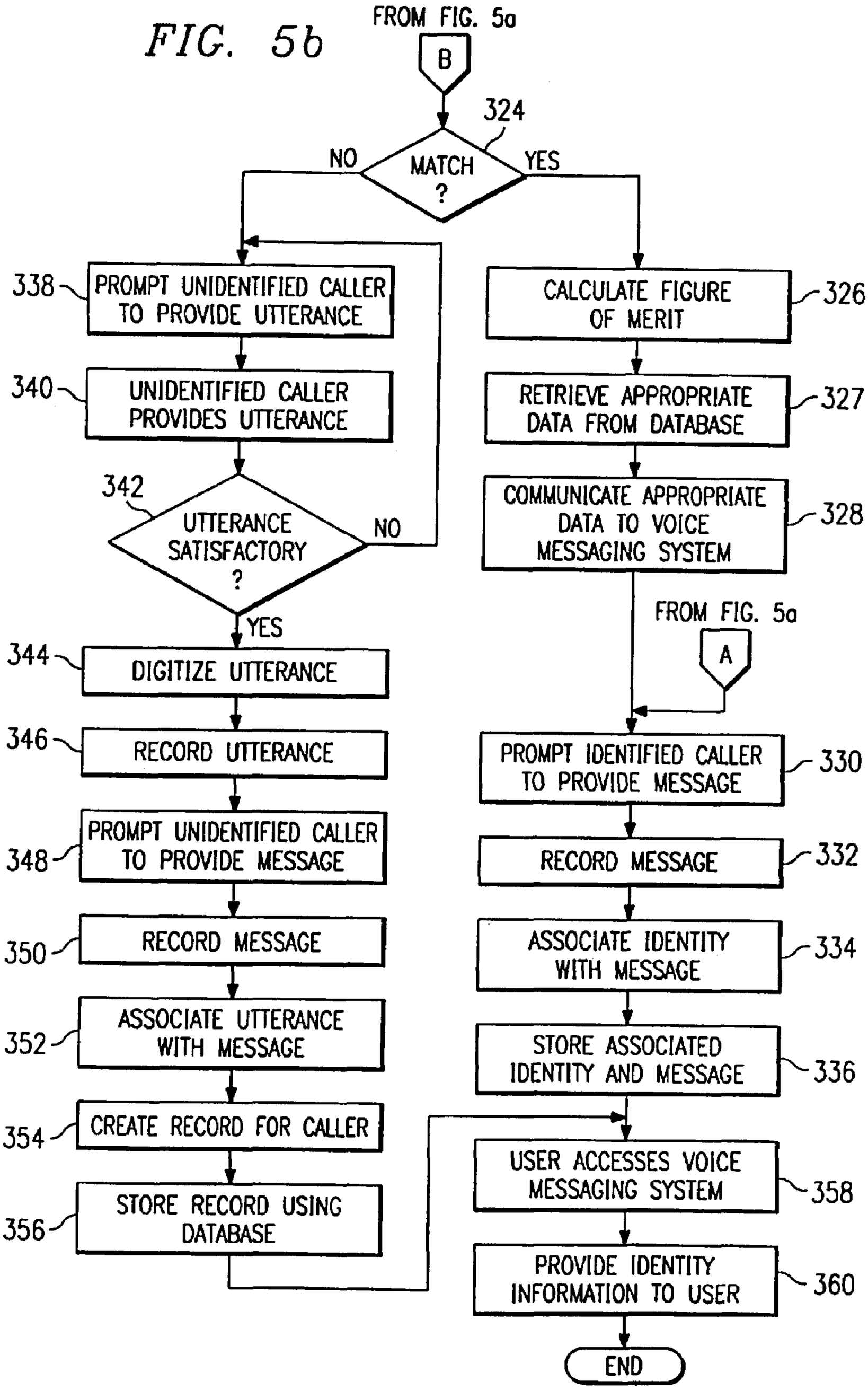

START
UNIDENTIFIED CALLER PLACES CALL TO ORGANIZATION
300
VOICE MESSAGING SYSTEM RECEIVES INCOMING CALL
302
CAN IDENTITY OF UNIDENTIFIED CALLER BE DETERMINED ?
304
YES
A
TO FIG. 5b
NO
GENERATE GREETING
306
DETERMINE AMBIGUITY-RESOLUTION INFORMATION
307
PROMPT UNIDENTIFIED CALLER TO PROVIDE UTTERANCE
308
UNIDENTIFIED CALLER PROVIDES UTTERANCE
310
UTTERANCE SATISFACTORY ?
312
NO
YES
DIGITIZE UTTERANCE
314
RECORD UTTERANCE
316
COMMUNICATE DIGITIZED UTTERANCE TO DATABASE SERVER FOR COMPARISON
318
ACCESS DATABASE
320
SEARCH RECORDS FOR MATCHING UTTERANCE IDENTIFIER
322
B
TO FIG. 5b

FIG. 5b


FROM FIG. 5a
B
324
MATCH ?
NO
YES
338
PROMPT UNIDENTIFIED CALLER TO PROVIDE UTTERANCE
340
UNIDENTIFIED CALLER PROVIDES UTTERANCE
342
UTTERANCE SATISFACTORY ?
NO
YES
344
DIGITIZE UTTERANCE
346
RECORD UTTERANCE
348
PROMPT UNIDENTIFIED CALLER TO PROVIDE MESSAGE
350
RECORD MESSAGE
352
ASSOCIATE UTTERANCE WITH MESSAGE
354
CREATE RECORD FOR CALLER
356
STORE RECORD USING DATABASE
CALCULATE FIGURE OF MERIT
326
RETRIEVE APPROPRIATE DATA FROM DATABASE
327
COMMUNICATE APPROPRIATE DATA TO VOICE MESSAGING SYSTEM
328
FROM FIG. 5a
A
PROMPT IDENTIFIED CALLER TO PROVIDE MESSAGE
330
RECORD MESSAGE
332
ASSOCIATE IDENTITY WITH MESSAGE
334
STORE ASSOCIATED IDENTITY AND MESSAGE
336
USER ACCESSES VOICE MESSAGING SYSTEM
358
PROVIDE IDENTITY INFORMATION TO USER
360
END

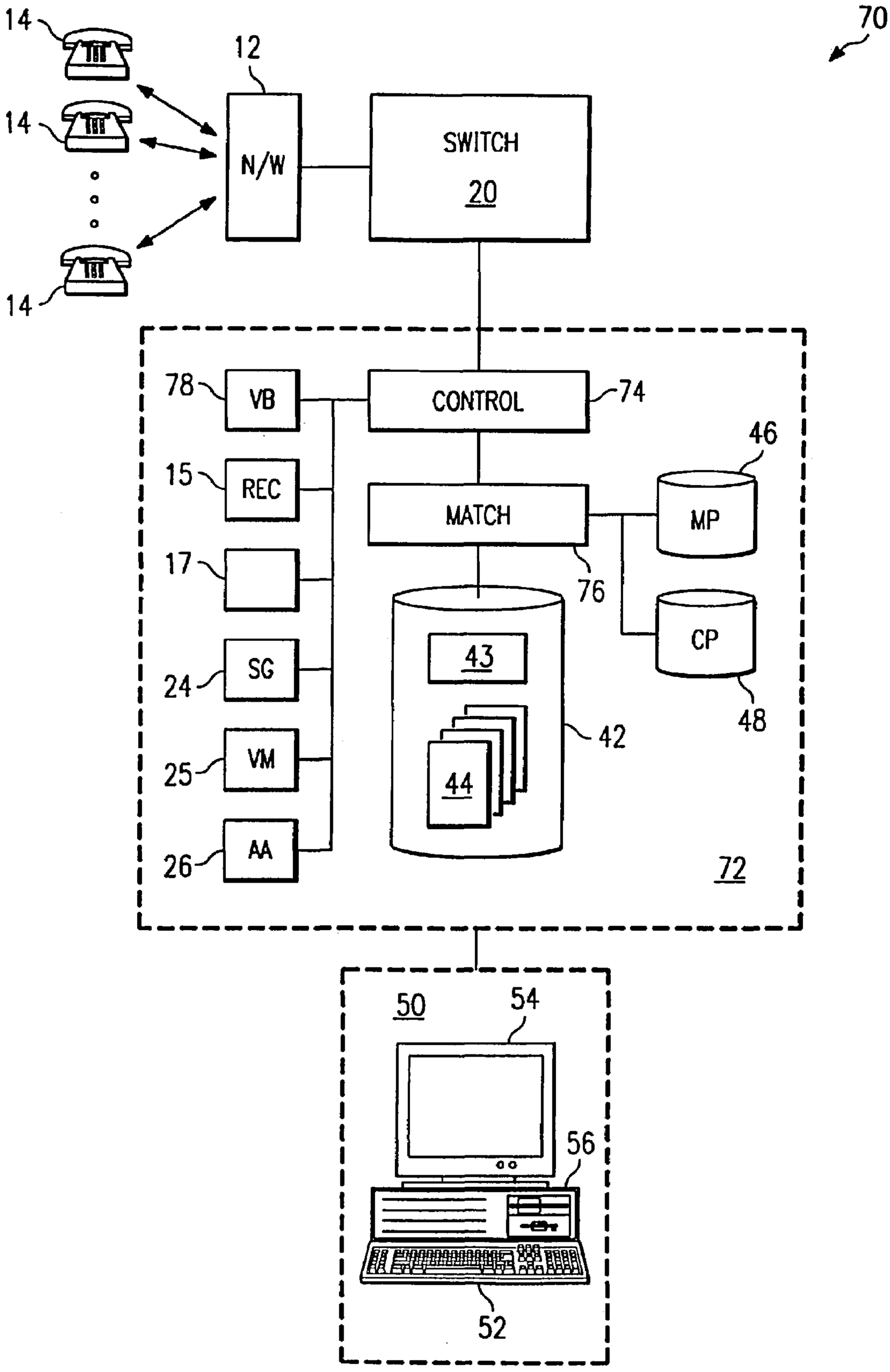

70
14
14
14
12
N/W
SWITCH
20
78
VB
CONTROL
74
15
REC
17
24
SG
25
VM
26
AA
MATCH
46
MP
76
CP
48
43
44
42
72
50
54
56
52

FIG. 6

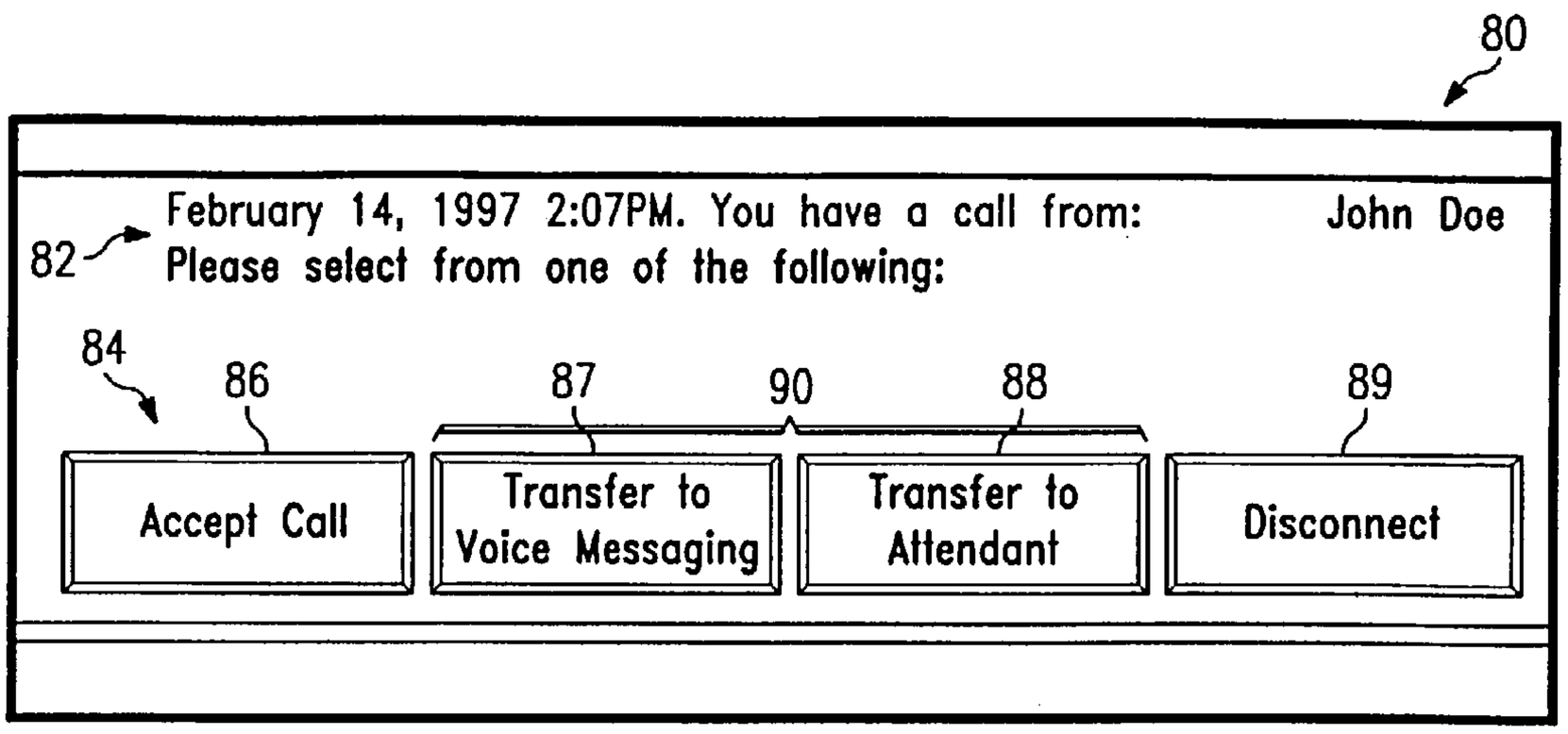

80
82
February 14, 1997 2:07PM. You have a call from:
John Doe
Please select from one of the following:
84
86
87
90
88
89
Accept Call
Transfer to Voice Messaging
Transfer to Attendant
Disconnect

FIG. 7a

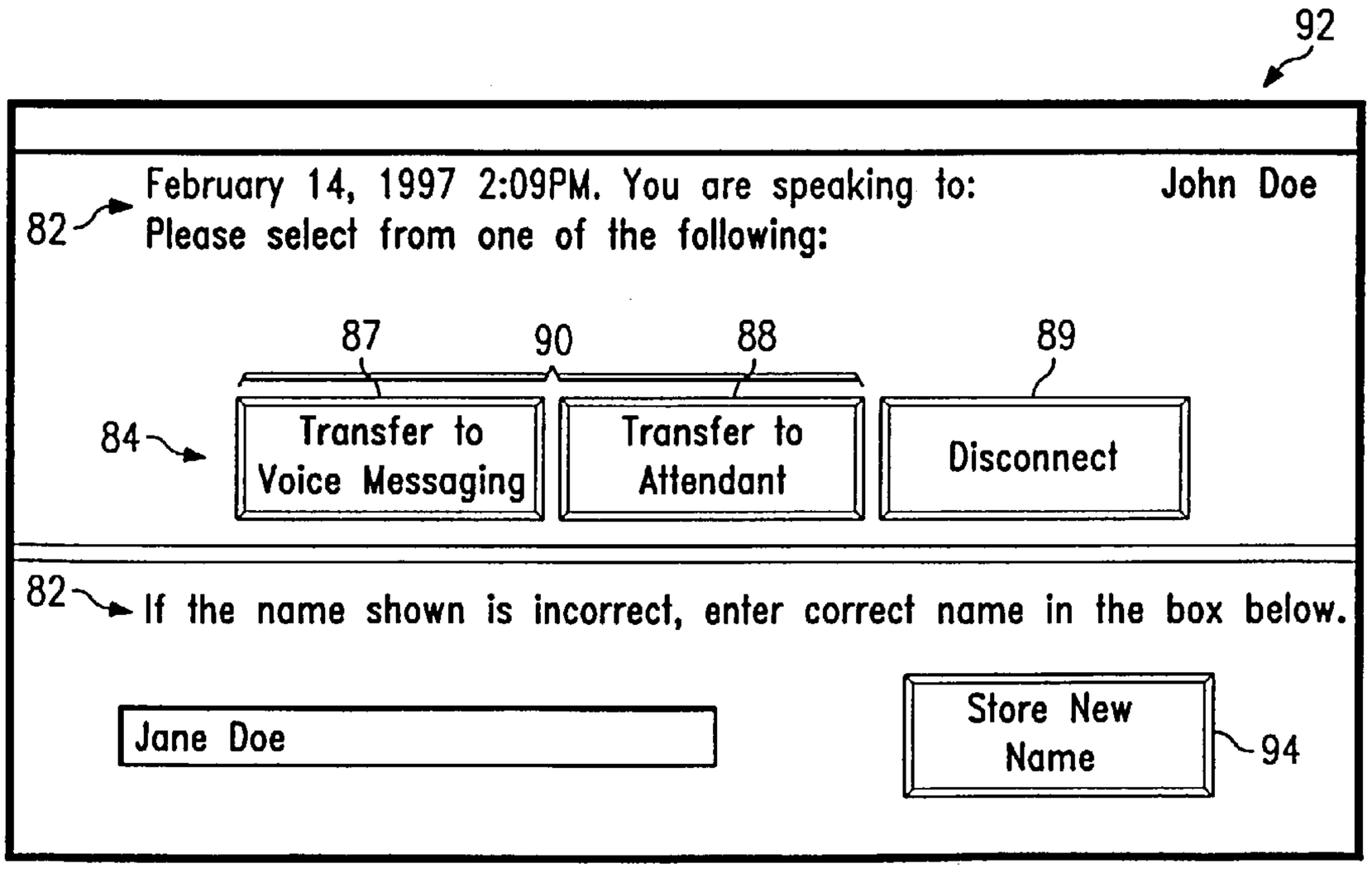

92
82
February 14, 1997 2:09PM. You are speaking to:
John Doe
Please select from one of the following:
87
90
88
89
84
Transfer to Voice Messaging
Transfer to Attendant
Disconnect
82
If the name shown is incorrect, enter correct name in the box below.
Jane Doe
Store New Name
94

FIG. 7b

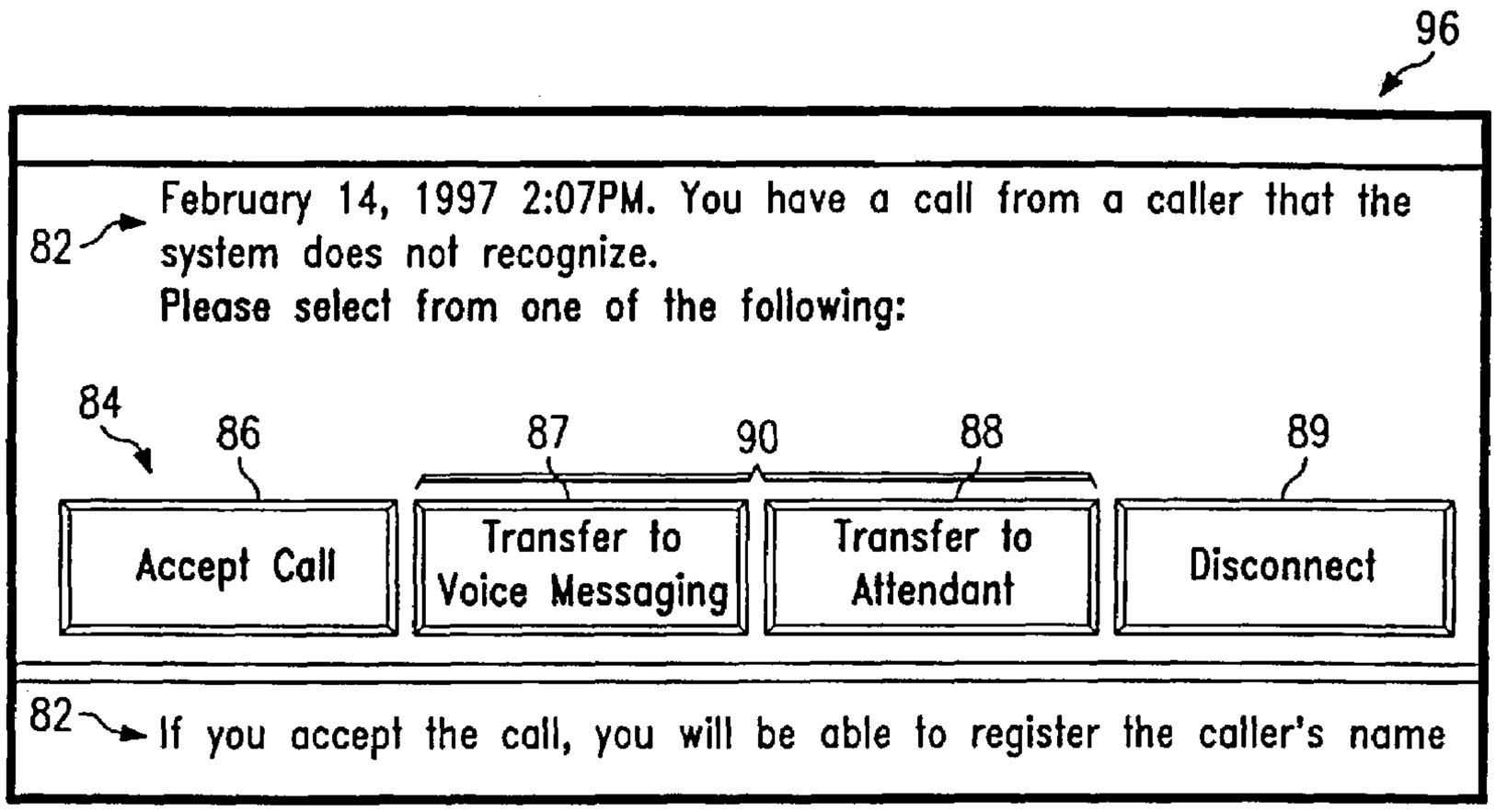

96
82
February 14, 1997 2:07PM. You have a call from a caller that the system does not recognize.
Please select from one of the following:
84
86
87
90
88
89
Accept Call
Transfer to Voice Messaging
Transfer to Attendant
Disconnect
82
If you accept the call, you will be able to register the caller's name

FIG. 7c

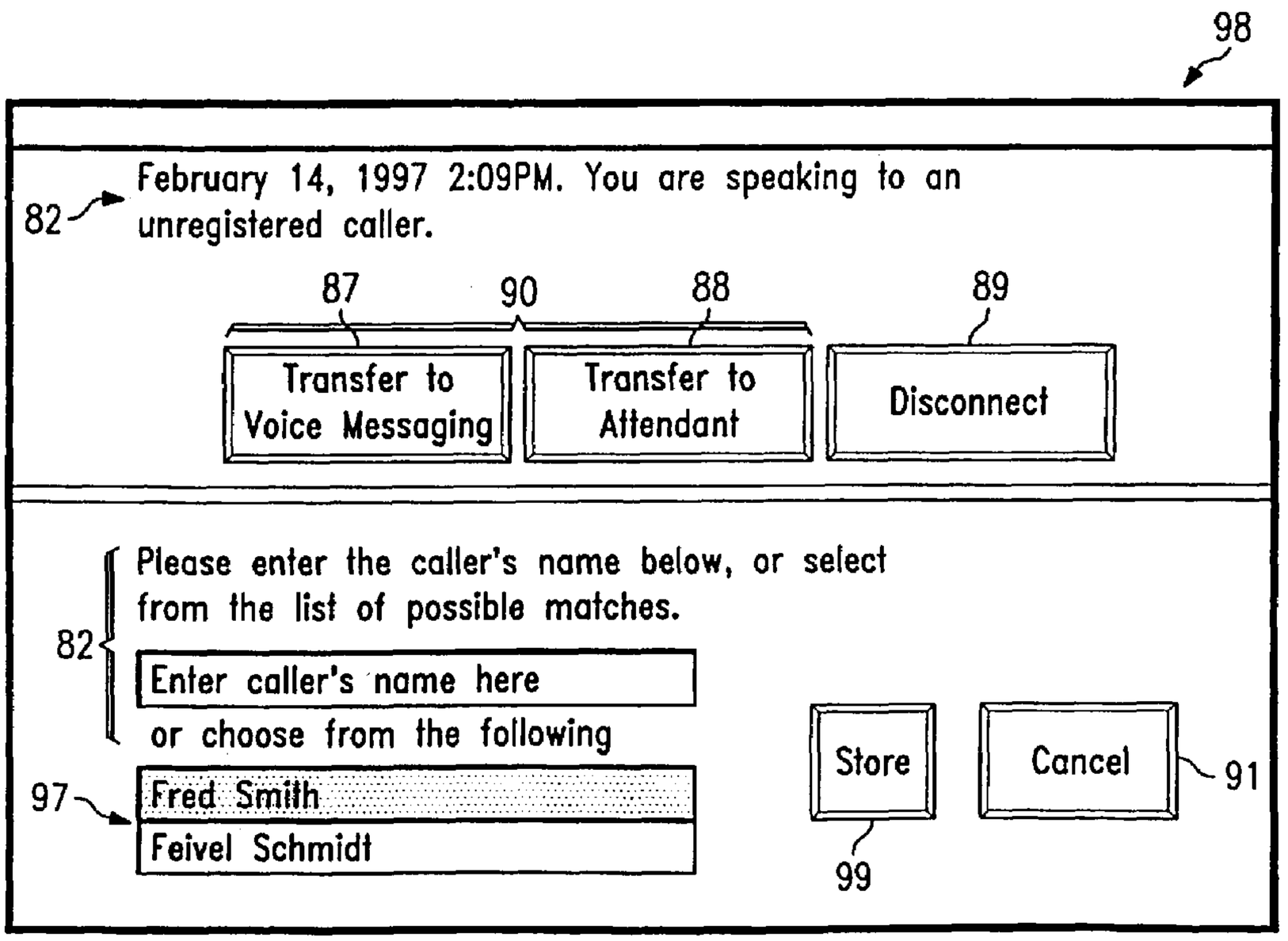

98
82
February 14, 1997 2:09PM. You are speaking to an unregistered caller.
87
90
88
89
Transfer to Voice Messaging
Transfer to Attendant
Disconnect
Please enter the caller's name below, or select from the list of possible matches.
82
Enter caller's name here
or choose from the following
97
Fred Smith
Feivel Schmidt
Store
Cancel
91
99

FIG. 7d

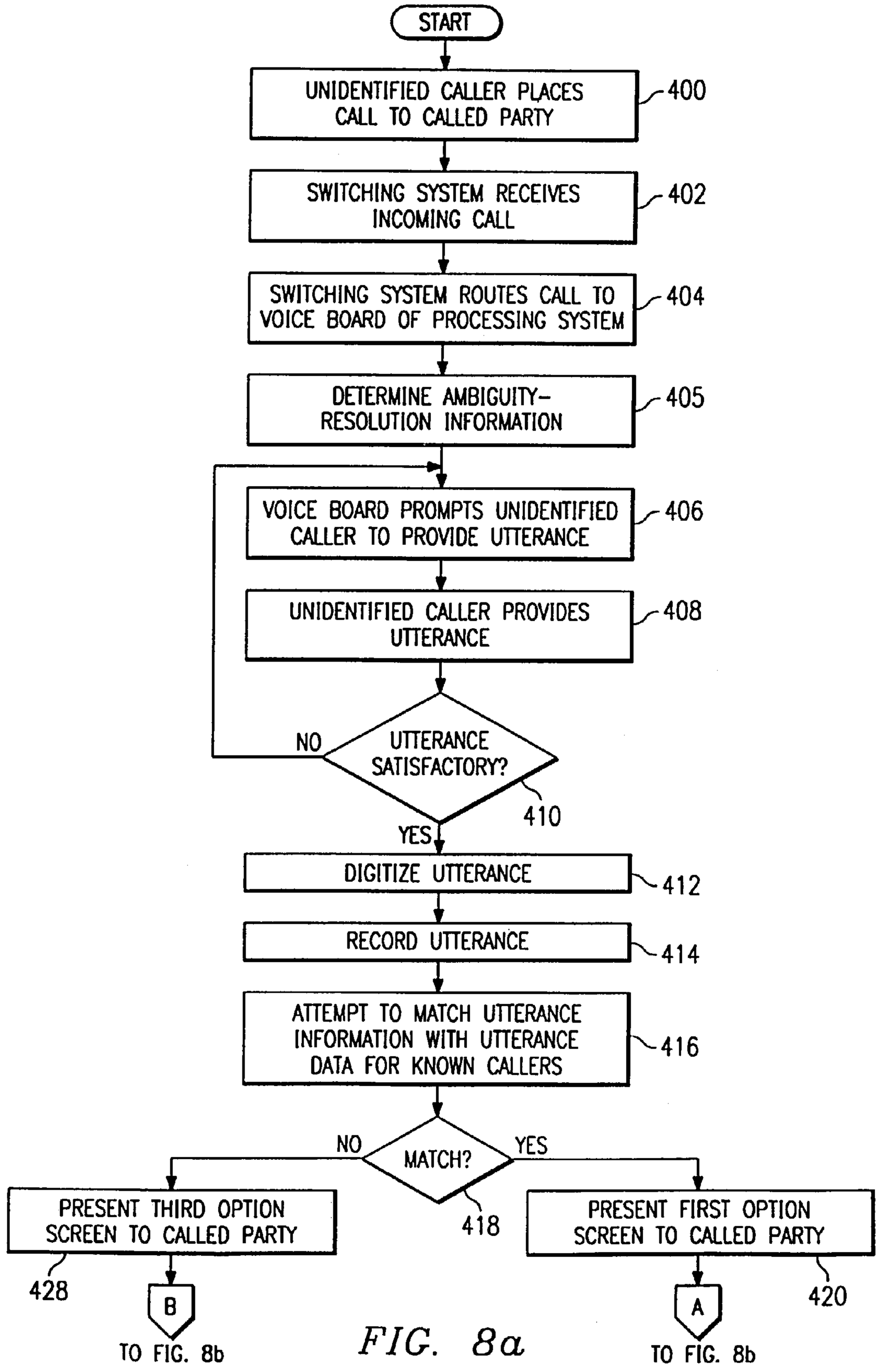
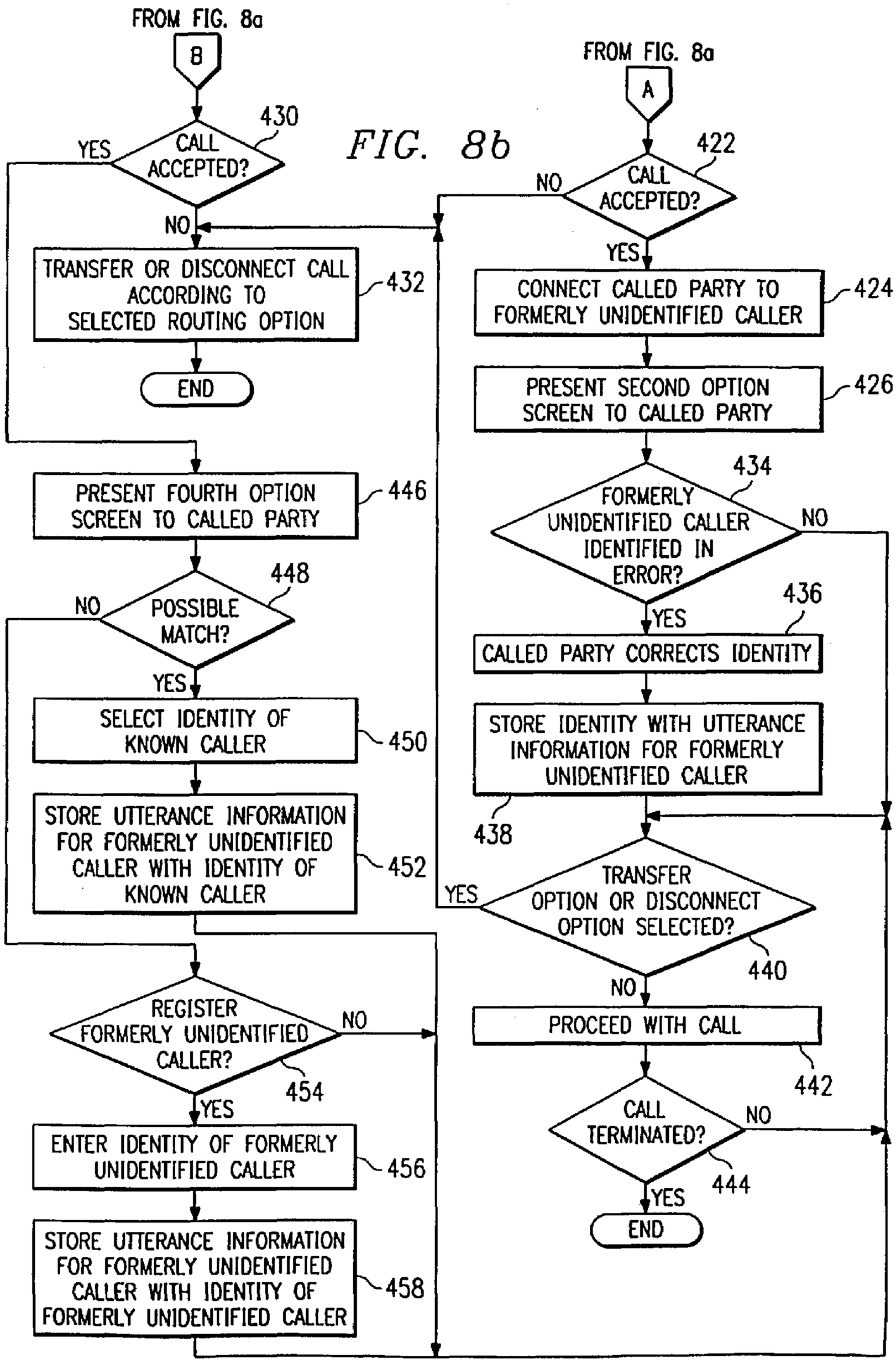
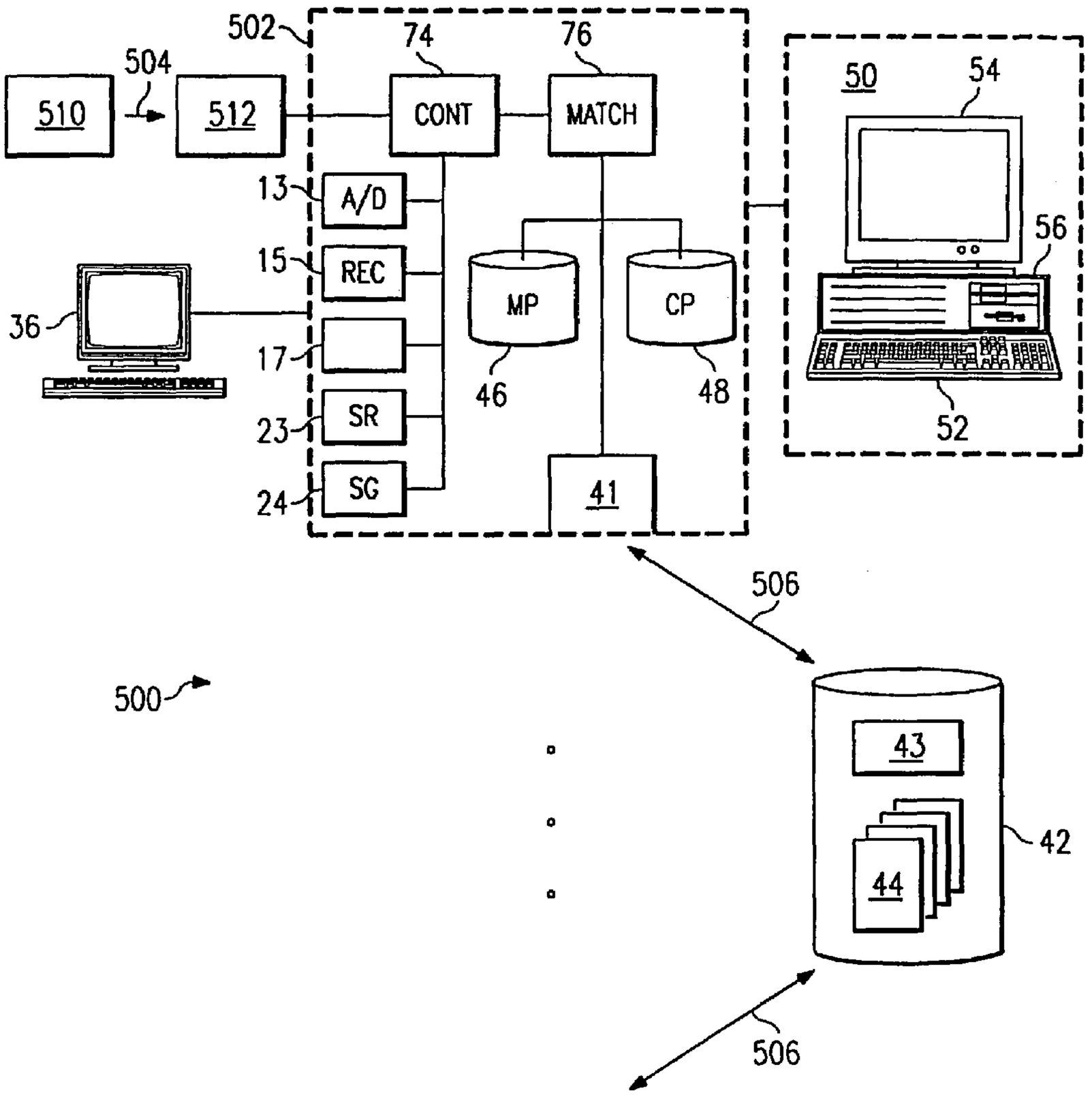

START
UNIDENTIFIED CALLER PLACES CALL TO CALLED PARTY
400
SWITCHING SYSTEM RECEIVES INCOMING CALL
402
SWITCHING SYSTEM ROUTES CALL TO VOICE BOARD OF PROCESSING SYSTEM
404
DETERMINE AMBIGUITY-RESOLUTION INFORMATION
405
VOICE BOARD PROMPTS UNIDENTIFIED CALLER TO PROVIDE UTTERANCE
406
UNIDENTIFIED CALLER PROVIDES UTTERANCE
408
NO
UTTERANCE SATISFACTORY?
410
YES
DIGITIZE UTTERANCE
412
RECORD UTTERANCE
414
ATTEMPT TO MATCH UTTERANCE INFORMATION WITH UTTERANCE DATA FOR KNOWN CALLERS
416
NO
MATCH?
YES
418
PRESENT THIRD OPTION SCREEN TO CALLED PARTY
428
B
TO FIG. 8b
PRESENT FIRST OPTION SCREEN TO CALLED PARTY
420
A
TO FIG. 8b

FIG. 8a

FIG. 8b


FROM FIG. 8a
B
430
YES
CALL ACCEPTED?
NO
TRANSFER OR DISCONNECT CALL ACCORDING TO SELECTED ROUTING OPTION
432
END
PRESENT FOURTH OPTION SCREEN TO CALLED PARTY
446
448
NO
POSSIBLE MATCH?
YES
SELECT IDENTITY OF KNOWN CALLER
450
STORE UTTERANCE INFORMATION FOR FORMERLY UNIDENTIFIED CALLER WITH IDENTITY OF KNOWN CALLER
452
REGISTER FORMERLY UNIDENTIFIED CALLER?
NO
454
YES
ENTER IDENTITY OF FORMERLY UNIDENTIFIED CALLER
456
STORE UTTERANCE INFORMATION FOR FORMERLY UNIDENTIFIED CALLER WITH IDENTITY OF FORMERLY UNIDENTIFIED CALLER
458
FROM FIG. 8a
A
422
NO
CALL ACCEPTED?
YES
CONNECT CALLED PARTY TO FORMERLY UNIDENTIFIED CALLER
424
PRESENT SECOND OPTION SCREEN TO CALLED PARTY
426
434
FORMERLY UNIDENTIFIED CALLER IDENTIFIED IN ERROR?
NO
436
YES
CALLED PARTY CORRECTS IDENTITY
STORE IDENTITY WITH UTTERANCE INFORMATION FOR FORMERLY UNIDENTIFIED CALLER
438
TRANSFER OPTION OR DISCONNECT OPTION SELECTED?
YES
440
NO
PROCEED WITH CALL
442
CALL TERMINATED?
NO
444
YES
END


502
74
76
504
510
512
CONT
MATCH
50
54
13
A/D
15
REC
MP
CP
56
36
17
46
48
SR
23
52
SG
24
41
506
500
43
42
44
506

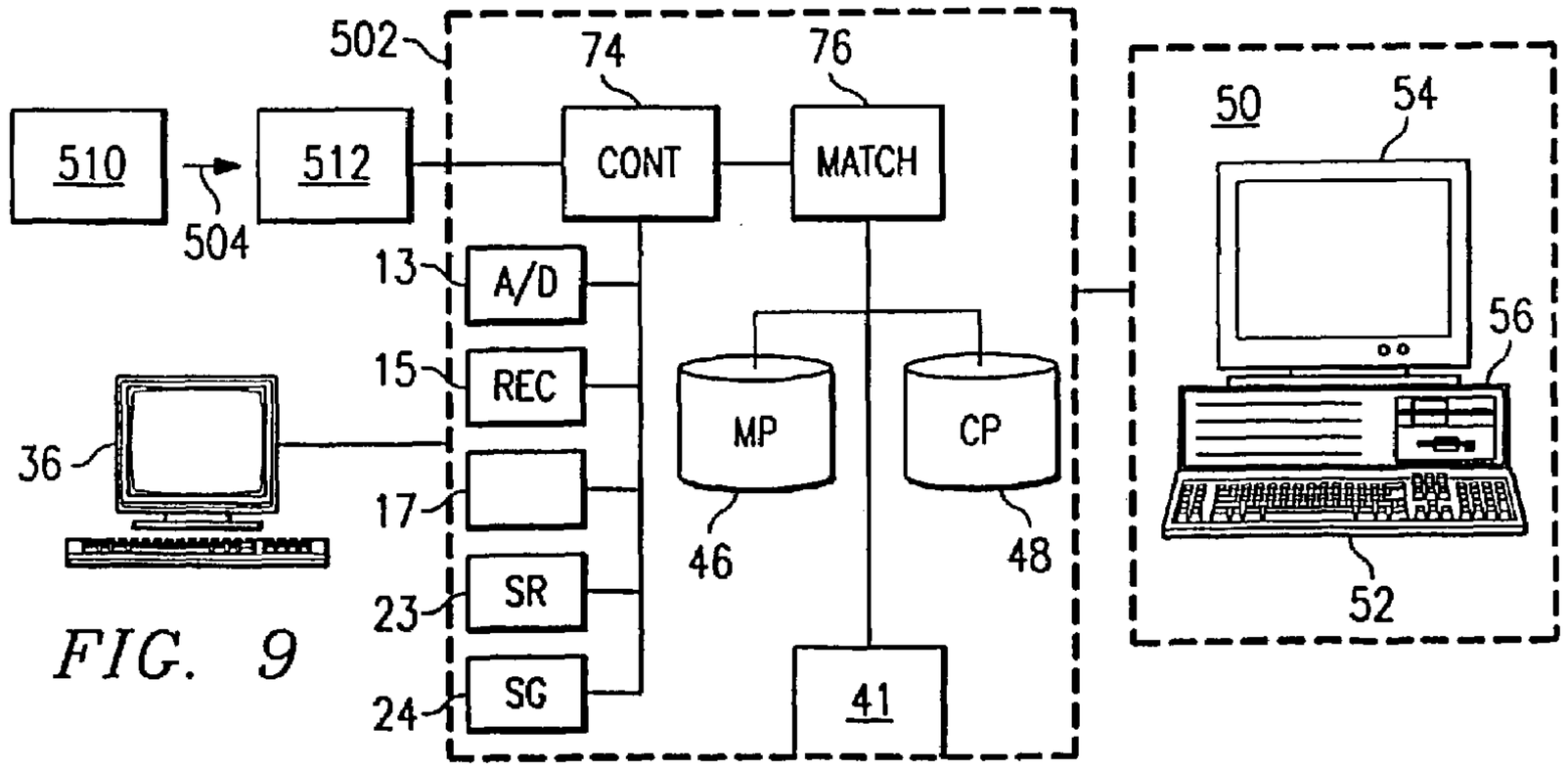

502
74
76
510
512
CONT
MATCH
50
54
504
13
A/D
15
REC
MP
CP
56
36
17
46
48
SR
23
52
SG
24
41

FIG. 9

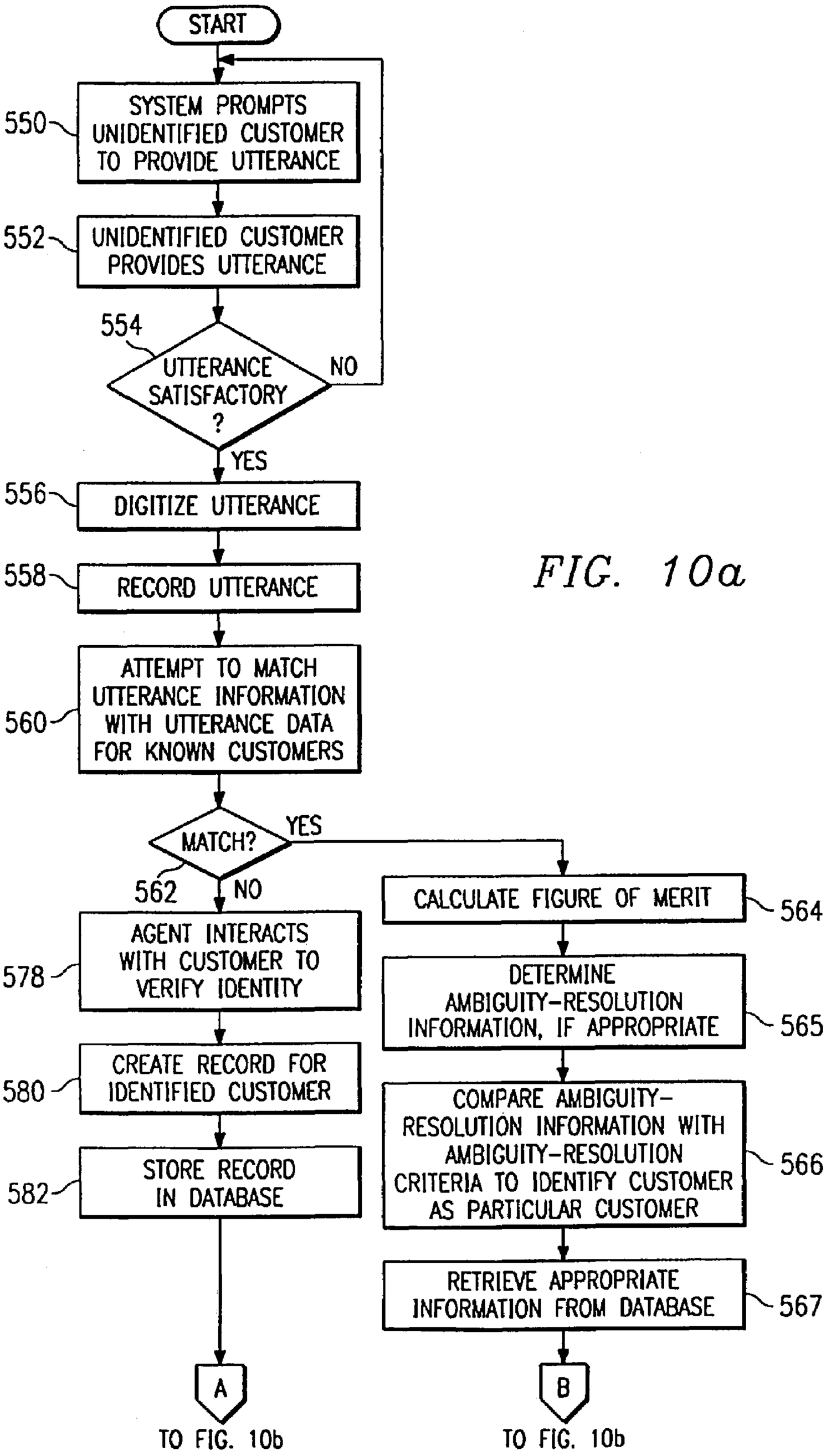

START
550
SYSTEM PROMPTS UNIDENTIFIED CUSTOMER TO PROVIDE UTTERANCE
552
UNIDENTIFIED CUSTOMER PROVIDES UTTERANCE
554
UTTERANCE SATISFACTORY ?
NO
YES
556
DIGITIZE UTTERANCE
558
RECORD UTTERANCE
560
ATTEMPT TO MATCH UTTERANCE INFORMATION WITH UTTERANCE DATA FOR KNOWN CUSTOMERS
MATCH?
YES
562
NO
578
AGENT INTERACTS WITH CUSTOMER TO VERIFY IDENTITY
580
CREATE RECORD FOR IDENTIFIED CUSTOMER
582
STORE RECORD IN DATABASE
A
TO FIG. 10b
CALCULATE FIGURE OF MERIT
564
DETERMINE AMBIGUITY-RESOLUTION INFORMATION, IF APPROPRIATE
565
COMPARE AMBIGUITY-RESOLUTION INFORMATION WITH AMBIGUITY-RESOLUTION CRITERIA TO IDENTIFY CUSTOMER AS PARTICULAR CUSTOMER
566
RETRIEVE APPROPRIATE INFORMATION FROM DATABASE
567
B
TO FIG. 10b

FIG. 10a

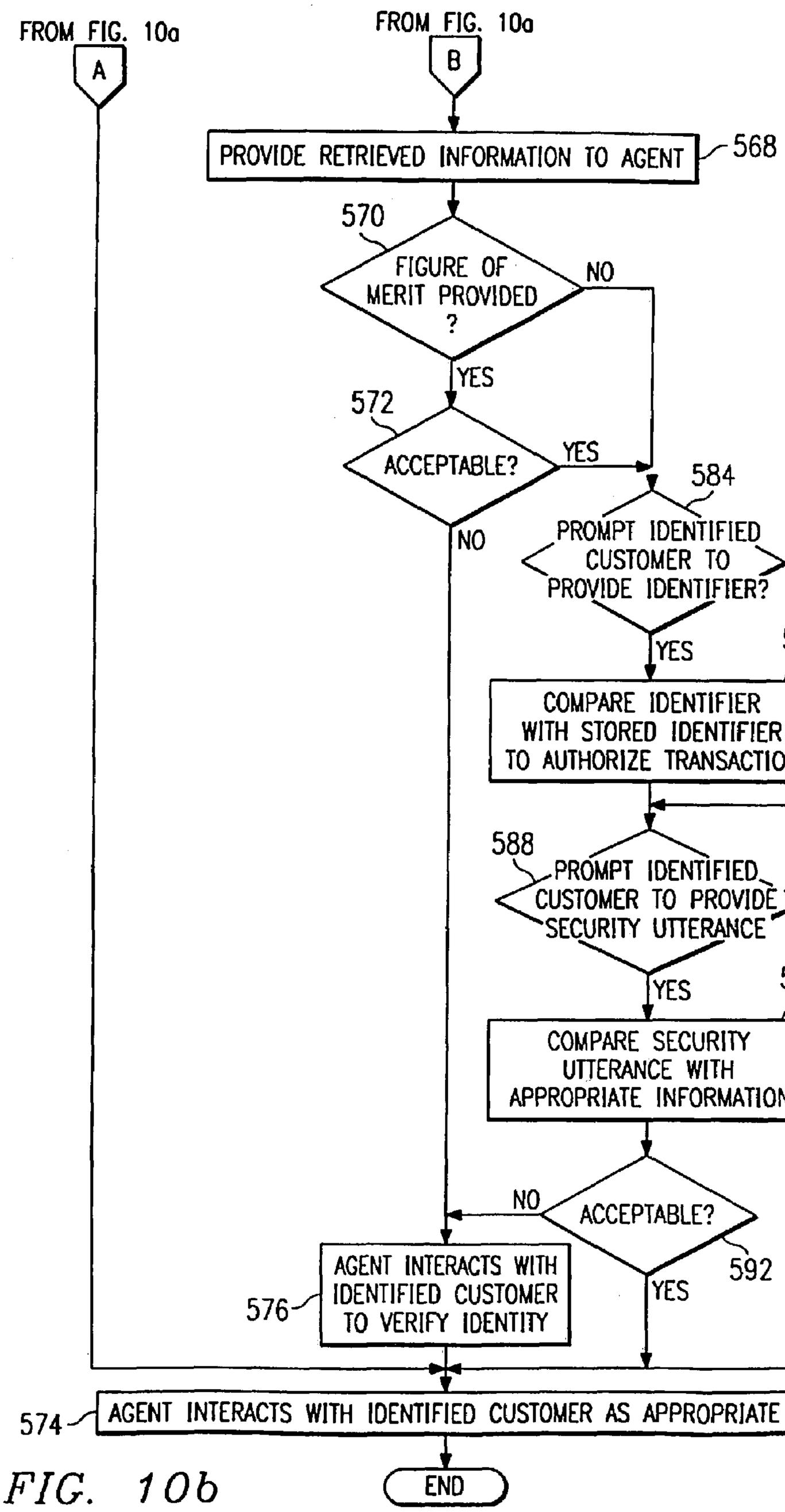

FROM FIG. 10a
A
FROM FIG. 10a
B
PROVIDE RETRIEVED INFORMATION TO AGENT
568
570
FIGURE OF MERIT PROVIDED ?
NO
YES
572
ACCEPTABLE?
YES
NO
584
PROMPT IDENTIFIED CUSTOMER TO PROVIDE IDENTIFIER?
NO
YES
586
COMPARE IDENTIFIER WITH STORED IDENTIFIER TO AUTHORIZE TRANSACTION
588
PROMPT IDENTIFIED CUSTOMER TO PROVIDE SECURITY UTTERANCE
NO
YES
590
COMPARE SECURITY UTTERANCE WITH APPROPRIATE INFORMATION
NO
ACCEPTABLE?
592
YES
576
AGENT INTERACTS WITH IDENTIFIED CUSTOMER TO VERIFY IDENTITY
574
AGENT INTERACTS WITH IDENTIFIED CUSTOMER AS APPROPRIATE
END

FIG. 10b

AUTHENTICATING A CALLER BEFORE PROVIDING THE CALLER WITH ACCESS TO ONE OR MORE SECURED RESOURCES

RELATED APPLICATIONS

This application is a continuation of U.S. application Ser. No. 09/799,977 filed on Mar. 2, 2001, now U.S. Pat. No. 6,526,126 B1, which is a continuation of U.S. application Ser. No. 08/982,190 filed Dec. 17, 1997, now U.S. Pat. No. 6,205,204 B1, which is a continuation-in-part of U.S. application Ser. No. 08/672,677 filed Jun. 28, 1996, now U.S. Pat. No. 5,940,476, a continuation-in-part of U.S. application Ser. No. 08/819,482 filed Mar. 17, 1997, now U.S. Pat. No. 5,901,203, and a continuation-in-part of U.S. application Ser. No. 08/918,937 filed Aug. 25, 1997, now U.S. Pat. No. 6,529,881 B2.

TECHNICAL FIELD OF THE INVENTION

This invention relates in general to the field of telecommunications, and more particularly to authenticating a caller before providing the caller with access to one or more secured resources.

BACKGROUND OF THE INVENTION

Many people, organizations, and commercial and other establishments may identify callers, customers, and other persons for security, billing, record keeping, or other purposes. For example, a customer service representative for a mail order sales organization might identify a caller to verify the caller's authority to receive information concerning an order placed with the organization. A called party in a business, organizational, home, or other setting might elect to accept a call, disconnect a call, or route a call to another person or processing device according to the identity of the caller. A clerk for a commercial or other establishment might identify a customer at the point of sale to allow an informed decision to be made regarding whether to provide goods, services, or other benefits to the customer.

As identification and identity verification procedures become more advanced to serve various needs, these people, organizations, and establishments may identify callers, customers or other persons using a variety of techniques. A known technique for identifying a caller receives a telephone number associated with an incoming call and compares the number with previously stored information to identify the caller associated with the incoming call. These techniques may be unsatisfactory if the caller is calling from a telephone, extension, or location having a telephone number that is different than the number for which there is previously stored information. Other techniques may even compare a spoken word or phrase identifying the caller with a stored voice print to verify an identification made as result of personal interaction with the caller or through digit or voice recognition of a personal identification number (PIN), account number, or other identifier. These and other techniques requiring personal interaction with callers to generate information for comparison with stored identification information are often relatively inefficient and costly.

A known technique for identifying a customer includes receiving a PIN or account number to identify the customer, either verbally or using a magnetic card reader, and then comparing the number with previously stored information to verify the availability to the customer of a good, service, or other benefit. Such techniques are wholly inadequate if the customer loses his card or has it stolen, cannot remember his number or identifier, or is otherwise unable to provide the requisite information. Furthermore, such techniques are burdensome to both the customer and the establishment in that the customer must remember the number or identifier, or carry with him the appropriate card, and the establishment must devote employee resources to the identity verification process.

Although possibly acceptable to verify the identity of an identified caller, customer, or other person, the above techniques do not identify an unidentified person out of a universe of known persons. These and other disadvantages make previous techniques for identifying persons inadequate for many applications.

SUMMARY OF THE INVENTION

The present invention addresses disadvantages and problems associated with previous systems and methods for identifying persons.

In one embodiment, a system is provided for authenticating a caller before providing the caller with access to one or more secured resources. Identification and verification data is stored during system enrollment of a plurality of known persons. A processing system is operable to, in a current call initiated by a currently unidentified caller and prior to identification of the currently unidentified caller, receive voice-based information for the currently unidentified caller based on one or more words spoken by the currently unidentified caller in the current call, the received voice-based information for the currently unidentified caller including a digital representation of a telephone number spoken by the currently unidentified caller in the current call, the received voice-based information including voice-based identification information and voice-based verification information for the currently unidentified caller. The processing system is operable to automatically compare the received voice-based identification information and the received voice-based verification information for the caller, which was received in the current call prior to identification of the currently unidentified caller, with the stored identification and verification data for a plurality of known persons, respectively, which was stored during enrollment of these known persons, to uniquely identify and verify the identity of the caller as a particular one of these known persons. The processing system is operable to authenticate the caller for access to the one or more secured resources in response to uniquely identifying and verifying the identity of the caller as the particular one of the known persons.

In another embodiment, a system is provided for uniquely and unambiguously identifying a currently unidentified caller. Voiceprint data is stored for each of a plurality of known persons, and additional identifying data is stored for each of the plurality of known persons, the voiceprint data and additional identifying data for each known person having been stored independently of each other in one or more previous calls that were initiated by the known person. A processing system is operable to, in a current call initiated by a currently unidentified caller and prior to identification of the caller, receive voiceprint data and additional identifying data for the caller, the voiceprint data and additional identifying data for the caller being independent of each other. The processing system is operable to automatically perform an initial comparison of the voiceprint data for the still currently unidentified caller, which was received in the current call prior to identification of the caller, with the stored voiceprint data for at least one known person, which

was stored in one or more previous calls initiated by the known person, to positively identify the caller as at least one of the known persons. If the caller is positively yet ambiguously identified as more than one of the known persons as a result of the initial comparison, the processing system is operable to automatically perform an additional comparison of the additional identifying data for the caller, which was received in the current call prior to identification of the caller, with the stored additional identifying data for at least one known person, which was stored in one or more previous calls initiated by the known person, to uniquely and unambiguously identify the caller as a particular one of the known persons. The additional identifying data for a known person includes one of at least a portion of a telephone number, at least a portion of a network address, a store identifier, and historical purchasing information.

The present invention provides a system and method for identifying an unidentified person that does not merely verify the identity of the person, but identifies the unidentified person from among a universe of known persons while resolving any ambiguities in that identification. Although the present invention identifies the unidentified person irrespective of the location, switching system, trunk line, or telephone number from which the person may be calling, the present invention uses such information as one or more ambiguity-resolution criteria when appropriate to resolve an ambiguous identification of the person as two or more known persons. The present invention may therefore increase the efficiency and accuracy of the identification process. Other ambiguity-resolution criteria, for example, store identifiers, historical purchasing information, and other suitable criteria, may be similarly employed.

In a commercial setting, the system and method of the present invention identifies an unidentified person at the point of sale, using appropriate criteria to resolve ambiguous identifications, without requiring the person to remember a PIN, account number, or other identifier, or to physically provide a card containing this information in magnetic form. Furthermore, the present invention may be self-learning, such that the likelihood of identifying a particular unidentified person increases each time the person interacts with the system. Moreover, the present invention may automatically provide stored information concerning a known person in response to the system identifying the unidentified person as the known person, which further increases the efficiency of the interaction with the person.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and for further features and advantages thereof, reference is now made to the following description taken in conjunction with the accompanying drawings, in which:

FIG. **1** illustrates a system for identifying an unidentified caller;

FIG. **2** illustrates a system for identifying an unidentified caller in a voice messaging environment;

FIGS. **3***a* through **3***c* illustrate relationships between account identifiers for known callers and identity data, order data, and utterance data respectively, for the known callers;

FIGS. **4***a* and **4***b* are a flow chart illustrating a method of identifying an unidentified caller;

FIGS. **5***a* and **5***b* are a flow chart illustrating a method for identifying an unidentified caller in a voice messaging environment;

FIG. **6** illustrates a computer-based system for identifying an unidentified caller;

FIGS. **7***a* through **7***d* illustrate exemplary option screens;

FIGS. **8***a* and **8***b* are a flow chart illustrating a method of identifying an unidentified caller;

FIG. **9** illustrates a system for identifying an unidentified customer at the point of sale; and

FIGS. **10***a* and **10***b* are a flow chart illustrating a method for identifying an unidentified customer at the point of sale.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** illustrates a system **8** for identifying an unidentified caller that includes a processing system **10**, a network (N/W) **12**, one or more agents **36**, and a database **42**. Processing system **10** is coupled to and interacts with network **12**. Network **12** may be a public switched telephone network (PSTN) or any other suitable network to receive incoming calls from one or more unidentified callers **14** and transmit the incoming calls to a telephone switching system (SWITCH) **20** using link **22**. Network **12** may include one or more local, exchange area, and/or long-haul networks to communicate information in analog, digital, or any other suitable form using any appropriate transmission facility. Link **22** may include one or more subscriber lines or other appropriate wireline or wireless links for connecting unidentified callers **14** to switching system **20** using network **12**. Although unidentified callers **14** are discussed in the plural, the present invention contemplates a single or multiple unidentified callers **14**.

Switching system **20** may be a private branch exchange (PBX) system; a central exchange (centrex) system; an automatic call distribution (ACD) system; a key telephone system; a telephone that is directly, indirectly, locally, remotely, or otherwise connected to network **12**; or any other appropriate telephone switching system. Switching system **20** may include a speech generation capability (SG) **24**, a voice messaging (VM) capability **25**, an automated attendant (AA) capability **26**, and any other suitable voice processing or call processing capabilities **28**, in any suitable combination, whether directly integrated into switching system **20** or as adjunct processors operating on one or more computers or other processing devices at one or more locations and appropriately coupled to switching system **20**. Switching system **20** also includes analog-to-digital (A/D) conversion and recording (REC) facilities **13** and **15**, respectively, which may include suitable hardware and software to digitize and record utterances provided by unidentified callers **14**. In one embodiment, switching system **20** includes a suitable "caller ID," automatic number identification (ANI), or other facility **17** that identifies telephone numbers, or portions thereof such as area codes or office codes, from which unidentified callers **14** are calling. While not shown, switching system **20** further includes one or more call processors for coordinating the operations of the various components of switching system **20** and one or more suitable buses to allow the components to communicate information.

Switching system **20** is coupled to and interacts with system server **30** using link **32**. Link **32** may be any suitable connection through a local area network (LAN), metropolitan area network (MAN), wide area network (WAN), a global computer network such as the Internet, or other appropriate network; a standard data link and protocol connection used to connect an external computer to a telephone switching system, such as a Telephony Services Application Programming Interface (TSAPI); a service provider's proprietary interface; an integrated services digital

network (ISDN) link; an internal bus; or any other appropriate connection. The present invention contemplates system server **30** being integral to or separate from switching system **20**.

System server **30** is a mainframe computer or other processing device that manages communications between switching system **20**, agents **36**, and database server **34** using links **32**, **31**, and **33**, as the case may be. System server **30** may also manage communications between processing system **10** and a network or other resource external to network **12**, agents **36**, and processing system **10**. System server **30** includes a memory **27** and a processor **29** that together operate to store, process, or manipulate data. Memory **27** may be any suitable memory, such as dynamic or static random access memory (RAM), read only memory (ROM), magnetic media, optical media, CD-ROM, or other suitable volatile or non-volatile storage media. Memory **27** may store information in files, directories, tables, or in any other suitable arrangement. Memory **27** may contain instructions for processor **29** to execute in managing the operations of system server **30**. The present invention contemplates multiple system servers **30** operating in parallel to increase the speed or otherwise improve the performance of processing system **10** in identifying one or more unidentified callers **14**.

Agents **36** may be autonomous or operated by one or more employees, representatives, operators, or other persons, possibly associated with an organization, that may interact in some manner with unidentified callers **14**. Link **31** may be a connection through a LAN, MAN, WAN, a global computer network such as the Internet, or any other suitable communications connection. Agents **36** may be any logical entities in hardware and/or software, such as minicomputers or personal computers, that send and receive information using link **31** and system server **30**. In one embodiment, a particular agent **36** interacts with unidentified caller **14** once unidentified caller **14** has been identified using processing system **10**. Although agents **36** are discussed, the present invention contemplates more or fewer agents **36** depending on the organization and the incoming call traffic generated by unidentified callers **14**.

Database server **34** is coupled to and interacts with database **42** and an associated database management system (DBMS) **43**. In one embodiment, database **42** is a relational database that stores information in tables containing rows and columns of data. The rows of a table represent records, which are collections of information about separate items, and the columns represent fields, which are particular attributes of the records. In conducting searches, database **42** matches information from a field in a first table with information in the corresponding field of a second table to produce a third table that combines requested data from the first and second tables. In general, database **42** uses matching values in two tables to relate information in one table to information in the other table. Database **42** may store and retrieve data in any suitable manner, and may include one or more databases, files, or other data repositories at a single or multiple locations internal to or external to processing system **10**. Database **42** may be more or less permanent or may be a temporary database, file, or other data repository created by extracting information from more permanent databases, files, or other data repositories for use in identifying unidentified callers **14**.

Database **42** contains one or more records **44** that each represent the association of an account or other identifier corresponding to a caller whose identity is known to the organization with account data, order data, identity data, utterance data, or other suitable information concerning the known caller. In one embodiment, the utterance data for each known caller includes one or more utterance identifiers that are digitized representations of one or more spoken utterances of the particular known caller, which may include any suitable sound, word, or phrase. The utterances provided by the known callers are digitized and recorded using the facilities **13** and **15**, respectively, associated with switching system **20**. The present invention contemplates multiple utterance identifiers for each known caller, whether stored in a single or multiple records **44** and in a single or multiple tables within database **42**. The association of account identifiers with identity data, order data, and utterance data for each known caller in records **44** is discussed more fully below in connection with FIGS. **3***a* through **3***c*.

Database server **34** may be a mainframe computer, a minicomputer, microprocessor having memory, or personal computer connected to a LAN, or any other processing device that manages communications between system server **30** and database **42**. Although database server **34** is shown as separate from system server **30**, database server **34** may be integral to or separate from system server **30**. Database server **34** supports a DBMS **43** that permits centralized control of security and data integrity requirements for database **42**.

In general, DBMS **43** is a layer of software between database **42** and database server **34** that manages access by processing system **10** to the resources of database **42**. Where database **42** is a relational database, the DBMS **43** supported by database server **34** may be a relational DBMS (RDBMS). DBMS **43** and database **42** may execute queries, conduct searches, or perform other activities in response to direct or indirect communications from database server **34** in any suitable form. In one embodiment, database server **34** may provide a key or other suitable identifier to DBMS **43** for DBMS **43** to use in finding, identifying, or otherwise locating one or more records or groups of records within database **42** according to one or more key tables, index files, or other suitable arrangement.

Database server **34** includes a memory **35** and a processor **37** that together operate to store, process, or manipulate data. Memory **35** may be any suitable memory, such as dynamic or static random access memory (RAM), read only memory (ROM), magnetic media, optical media, CD-ROM, or other suitable volatile or non-volatile storage media. Memory **35** may store information in files, directories, tables, or in any other suitable arrangement. Memory **35** may contain instructions for processor **37** to execute in managing the operations of database server **34** and the DBMS **43** supported by database server **34**.

Database server **34** accesses one or more match parameters **46** to determine whether a digitized utterance for an unidentified caller **14** is sufficiently correlated with an utterance identifier corresponding to a particular known caller to identify the unidentified caller **14** as the known caller. Match parameters **46** may include, without limitation: an error or discrimination threshold suitable for comparison with an error value derived, calculated, or otherwise determined according to the comparison of the digitized utterance with the utterance identifier, for example, in the manner disclosed in U.S. Pat. No. 4,053,710, which is incorporated by reference herein; a merit parameter for associating a figure of merit, determined according to some suitable scale and in some suitable manner, with the identification of an unidentified caller **14** as a particular known caller; or any other information suitable for determining the sufficiency of the correlation, if any, between utterances for unidentified

callers **14** and utterance identifiers for known callers in database **42**. Database server **34** may communicate one or more match parameters **46** to DBMS **43** in association with a key or other suitable identifier to facilitate the location and retrieval of one or more utterance identifiers or other information from database **42**.

Database server **34** communicates with database **42** using interface **41**. Interface **41** may be any mechanism suitable to allow database server **34** and database **42** to communicate with one another. For example, interface **41** may include the appropriate hardware and software to communicate using a direct connection to a PSTN, a direct connection using a bus or wireline link, a connection through a LAN, MAN, WAN, a global network such as the Internet, or other network, or any other communications connection suitable to access one or more databases or files at one or more locations. Interface **41** may include protocol conversion and some data processing capabilities suitable to allow interface **41** to facilitate data communications between database server **34** and database **42**.

Database server **34** and interface **41** may access one or more communication parameters **48** to communicate with database **42**. Communications parameters **48** maintain access information for each database, file, directory, or other data repository associated with database **42** that may include, without limitation: a username; a password; a telephone number; an Internet protocol (IP) address; communication port settings; database specifications; library and file names; directory paths; library and file paths; protocol information; and any other information suitable for communicating information to and receiving information from database **42**.

Processing system **10** may operate on one or more computers **50** that are integral to or separate from the hardware and software that support network **12**, agents **36**, system server **30**, database server **34**, and database **42**. Computer **50** may include an input device **52**, such as a keypad, touch screen, microphone, or other device that can accept suitable information. An output device **54** may convey information associated with the operation of processing system **10**, including digital or analog data, visual information, or audio information. Both input device **52** and output **54** may include fixed or removable storage media, such as magnetic computer disk, CD-ROM, or other suitable media to both receive output from and provide input to processing system **10**. Computer **50** may have a processor **56** and an associated volatile or non-volatile memory to execute instructions and manipulate information in accordance with the operation of processing system **10**.

In operation with respect to agents **36**, an unidentified caller **14** places a call to the organization using network **12** and link **22**. Switching system **20** receives the incoming call and prompts unidentified caller **14** to provide an utterance, such as the spoken name of unidentified caller **14**, using the associated speech generation capability **24**, by playing a prerecorded message, or in any other suitable manner. Before, during, or after prompting unidentified caller **14** to provide an utterance, switching system **20** uses facility **17** to identify the telephone number, or portion thereof such as the area code or office code, from which unidentified caller **14** is calling. When unidentified caller **14** responds by providing an utterance, switching system **20** receives, digitizes, and records the utterance using facilities **13** and **15**, respectively. Switching system **20** communicates the digitized utterance to system server **30** and queues the incoming call until an appropriate agent **36** becomes available. When an appropriate agent **36** becomes available, switching system **20** transfers the call to the appropriate agent **36** and provides the identity of the selected agent **36** to system server **30**.

In parallel with the queuing and transfer of the incoming call, system server **30** communicates the digitized utterance to database server **34**, which together with associated DBMS **43** searches records **44** contained in database **42** to compare the digitized utterance with the stored utterance identifiers corresponding to one or more known callers. If the digitized utterance suitably duplicates, resembles, matches, or is otherwise correlated with a stored utterance identifier according to one or more match parameters **46**, unidentified caller **14** is identified as the known caller corresponding to the particular stored utterance identifier. Database server **34** retrieves account data, order data, identity data, or any other appropriate information for the known caller from database **42** and communicates this information to the selected agent **36** using system server **30** and link **31**.

One or more ambiguity-resolution criteria may be used to identify unidentified caller **14**. Ambiguity-resolution criteria may be stored as account data, order data, identity data, or in any other suitable manner and may be compared with any of the following ambiguity-resolution information to resolve ambiguous identifications, without limitation: the telephone number or any portion thereof identified using facility **17**; an IP address from which unidentified caller **14** is calling in over the Internet or other computer network; a store location, store number, or other identifier determined using the number identified using facility **17**, an IP address, or in any other suitable manner; and any other appropriate ambiguity-resolution information. As discussed more fully below with reference to FIGS. **4***a* and **4***b*, processing system **10** uses one or more appropriate ambiguity-resolution criteria and appropriate ambiguity-resolution information to resolve an ambiguous identification of unidentified caller **14** as two or more known callers.

Processing system **10** may coordinate and synchronize the identification of and transfer of the call to selected agent **36**; the identification of unidentified caller **14** as a particular known caller, whether or not an ambiguity-resolution criterion is used; the retrieval of information corresponding to the known caller from database **42**; and the communication, delivery, or presentation of the information to selected agent **36** using any appropriate technique, whether or not switching system **20** and system server **30** are integrated with one another. After the selected agent **36** receives the retrieved information for the formerly unidentified caller **14**, the selected agent may interact with the caller to handle the incoming call in some suitable manner according to the needs of the caller or the organization. The present invention contemplates identifying one or more unidentified callers **14** using system **8** in any suitable business, organizational, or other context or application.

FIG. **2** illustrates a system **9** for identifying an unidentified caller **14** in a voice messaging environment that includes a processing system **11**, a network **12**, and a database **42**. The components and operation of system **9** that includes processing system **11** are similar to those discussed above with reference to FIG. **1** and system **8** that includes processing system **10**. System **9** may or may not include switching system **20**, automated attendant capability **26**, system server **30**, or agents **36**. The present invention contemplates system **9** that includes processing system **11** replacing or combining with system **8** that includes processing system **10** in some manner. Similar to processing system **10** discussed above, processing system **11** may operate on one or more computers **50** that are integral to or separate

from the hardware and software that support network **12**, database server **34**, and database **42**.

Voice messaging system **60** may be any voice mail or other system for receiving, recording, and storing messages from one or more unidentified callers **14** within or outside the organization. Voice messaging system **60** may be the same as, may replace, or may combine with voice messaging capability **25** of processing system **10** in some suitable manner. Voice messaging system **60** may be integral to or separate from a telephone switching system, such as switching system **20** discussed above in connection with FIG. **1**, and may receive incoming calls directly or through such a telephone switching system. Voice messaging system **60** may include analog-to-digital conversion facility **13**, recording facility **15**, "caller ID," ANI, or other facility **17**, a suitable speech recognition capability (SR) **23**, speech generation capability **24**, or any other suitable voice processing or call processing capabilities **28**, in any combination, whether directly integrated into voice messaging system **60** or as adjunct processors operating on one or more computers or other processing devices at one or more locations and suitably coupled to voice messaging system **60**.

In operation, an unidentified caller **14** places a call to the organization using network **12** and link **22**. Voice messaging system **60** receives the incoming call and, if voice messaging system **60** is not connected to a telephone system in such a way as to determine the identity of unidentified caller **14** according to the location, switching system, trunk line, or telephone number associated with unidentified caller **14**, prompts unidentified caller **14** to provide an utterance in the manner discussed above in connection with FIG. **1**. When unidentified caller **14** responds by providing an utterance, voice messaging system **60** receives, digitizes, and records the utterance using facilities **13** and **15**, respectively.

Voice messaging system **60** communicates the digitized utterance to database server **34**, which together with associated DBMS **43** searches records **44** contained in database **42** to compare the digitized utterance with stored utterance identifiers corresponding to one or more known callers. If the digitized utterance suitably duplicates, resembles, matches, or is otherwise correlated with a particular utterance identifier according to one or more match parameters **46**, unidentified caller **14** is identified as the known caller corresponding to the particular utterance identifier. As discussed more fully below with reference to FIGS. **5***a* and **5***b*, one or more ambiguity-resolution criteria may be used. Database server **34** retrieves appropriate information concerning the known caller from database **42**, such as a name or other identifier corresponding to the known caller, and communicates this information to voice messaging system **60**. Voice messaging system **60** prompts formerly unidentified caller **14** to provide a message, records the resulting message, associates the identity of formerly unidentified caller **14** with the message, and stores the associated identity and message corresponding to formerly unidentified caller **14** for subsequent communication to a user of voice messaging system **60**.

When a user of voice messaging system **60** accesses voice messaging system **60**, using a telephone connection, an integrated computer system, or in some other suitable manner, voice messaging system **60** provides the user with the identity of formerly unidentified caller **14** to indicate that a message corresponding to formerly unidentified caller **14** has been recorded. Voice messaging system **60** may provide the identity of formerly unidentified caller **14** to the user separately from or together with the recorded message. Where messages corresponding to multiple unidentified callers **14** have been recorded, voice messaging system **60** may provide the user with the identities of these formerly unidentified callers, in the form of a chronological list or otherwise, separately from or together with the corresponding recorded messages.

FIGS. **3***a* through **3***c* illustrate several exemplary relationships between account identifiers corresponding to one or more known callers and identity data, order data, and utterance data, respectively, for the known callers. Although in one embodiment, the tables discussed below may be related to one another using these account identifiers, the present invention contemplates using any suitable field within a record **44** to relate the record **44** to one or more other records **44** or tables of records **44** within database **42**, according to relational database techniques or in some other suitable manner. An account identifier for a known caller may include, for example, an account number for an account the known caller has with the organization. The present invention contemplates a particular known caller having multiple accounts and therefore multiple account identifiers and multiple records **44** in one or more of the tables discussed below. As discussed above, processing system **10** may use some or all of the information contained in records **44** as ambiguity-resolution criteria to resolve an ambiguous identification of unidentified caller **14** as two or more known callers.

FIG. **3***a* illustrates a table **100** that contains one or more records **44** for each known caller. Each record **44** includes an account identifier **102** that corresponds to a particular known caller and is associated with identity data **104** for the known caller. For each known caller, identity data **104** may include, without limitation: a last name, first name, middle name or initial, or other suitable identifier **106**; a gender **108**; a street or other address **110**; a city, county, state, country, or other location of residence **112**; a phone number or any portion thereof such as an area code or office code, facsimile number, IP or other network address, or another suitable communications identifier **114**; an organization or firm identifier **116**; a department or strategic business unit (SBU) identifier **118**; a location, number, or other identifier **119** associated with one or more commercial establishments, government offices, or other premises at which the known caller has received goods, services, or other benefits; historical purchasing information **121**; a security clearance **120**; and any other suitable identity information concerning a known caller and suitable for associating with an account identifier **102** for the known caller. The present invention contemplates multiple tables **100** arranged in any suitable manner to contain one or more account identifiers **102** in association with identity data **104** for each known caller.

FIG. **3***b* illustrates a table **130** that contains one or more records **44** for each known caller that each include an account identifier **102** that corresponds to a particular known caller and associated order data **132** for the known caller. Although order data **132** is discussed, the present invention contemplates one or more other tables containing records **44** for any type of information concerning the known callers, for example, banking, purchase, account, or other data concerning relationships the known callers have with the organization. Table **130** may contain multiple records **44** and order data **132** for any known caller, corresponding to multiple orders for the known caller.

Within each record **44**, order data **132** may include, without limitation: a unique order identifier **134** assigned to the order by the organization or otherwise; an order date **136**; a part number **138** assigned to each ordered item by the manufacturer or otherwise; a manufacturer identifier **140** for

each ordered item; a serial number **142** for each ordered item; an individual, aggregate, or other purchase amount **144** for the ordered items; an order status **146**; and any other information suitable for identifying, tracking, maintaining billing and inventory records for, or relating in any other suitable manner to the order that corresponds to the particular record **44**.

FIG. **3***c* illustrates a table **160** that contains one or more records **44** for each known caller that each include an account identifier **102** that corresponds to the particular known caller and associated utterance data **162** for the known caller. For each record **44**, utterance data **162** may include, without limitation: an utterance identifier **164** that includes any suitable digital or other representation of a verbal utterance provided by the particular known caller associated with the record **44**; parametric encoding data **165** corresponding to the utterance or one or more characteristics of the known caller; an utterance length **166** that is measured, assessed, calculated, or otherwise determined in any suitable manner according to any suitable scale; an average or other utterance pitch **168** that is measured, assessed, calculated, or otherwise determined in any suitable manner according to any suitable scale; the name **106** for the known caller; the gender **108** for the known caller, which may be associated in some manner with the utterance pitch **168**; and any other information concerning an utterance of a known caller that is suitable for comparison in some manner with corresponding information generated for an utterance provided by an unidentified caller **14**.

Table **160** may contain one or more records **44** for each account identifier **102**, each record **44** containing utterance data **162** that corresponds to a separately digitized and recorded utterance of the known caller associated with the account identifier **102**. Furthermore, database **42** may contain multiple tables **160**, each table corresponding to a specified range, minimum, maximum, or other value for one or more fields within utterance data **162**, such as utterance length **166**, utterance pitch **168**, gender **108**, or other suitable field. For example, a first table **160** might contain records **44** having utterance lengths **166** within a first range of values, a second table **160** might contain records **44** having utterance lengths **166** within a second range of values, and a third table **160** might contain records **44** having utterance lengths **166** within a third range of values. In identifying an unidentified caller **14**, processing system **10** may determine the length of the digitized utterance for unidentified caller **14** and compare the digitized utterance to one or more utterance identifiers **164** contained in the particular table **160** that corresponds to the length of the digitized utterance. Database **42** may contain as many tables **160** and types of tables **160** as are necessary or desirable.

Parametric encoding data **165** may be stored separately from or together with a corresponding utterance identifier **164**. In one embodiment, parametric encoding data **165** might represent one or more fields of identity data **104**, order data **132**, utterance data **162**, or any other information concerning the particular known caller that is suitable for association with utterance identifier **164** to identify an unidentified caller **14**. For example, parametric encoding data **165** might take the form of one or more moment invariants as disclosed in U.S. Pat. No. 4,053,710 to represent the utterance for the known caller more concisely than the utterance is represented by the corresponding utterance identifier **164**. A moment invariant is defined in U.S. Pat. No. 4,053,710, for a two dimensional waveform or wave pattern, as a measurement derived from the moment of the waveform, the moment being independent of the waveform position and the waveform size along the two dimensions. The moment invariants may be calculated by switching system **20** or an associated processing capability and then stored instead of, or in addition to, utterance identifier **164**, which may digitally represent the utterance in its entirety.

FIGS. **4***a* and **4***b* represent a flow chart of a method of identifying an unidentified caller **14**. The method begins at step **200**, where an unidentified caller **14** places a call to the organization using network **12** and link **22**. Although system **8** may receive and process incoming calls from multiple unidentified callers **14** serially, more or less simultaneously, or in any other temporal relationship, the method is discussed herein with reference to a single unidentified caller **14**. At step **202**, switching system **20** receives the incoming call from unidentified caller **14** and, at step **204**, generates a greeting for communication to unidentified caller **14**. Switching system **20** may generate the greeting using speech generation capability **24**, may play a prerecorded message to generate the greeting, or may generate the greeting in any other suitable manner.

Before, during, or after generating the greeting at step **204**, switching system **20** uses facility **17** at step **205** to identify the telephone number, or a portion thereof such as the three digit area code or three digit office code, from which unidentified caller **14** is calling. For example, if unidentified caller **14** is calling from the telephone number "(214) 555-1212," facility **17** may identify the entire number, the area code "214," or the office code "555," in any combination. Although three digit area codes and three digit office codes are discussed, facility **17** may identify any number of digits associated with the telephone number from which unidentified caller **14** is calling, in any suitable order and in any suitable combination. Switching system **20** may identify an IP or other network address of unidentified caller **14** at step **205** if unidentified caller **14** is calling over the Internet or other computer network. Other suitable techniques for associating an identifier with the telephone number, network address, or location from which unidentified caller **14** is calling may be used without departing from the intended scope of the present invention. One or more of these identifiers, singly or in any suitable combination, may be appropriate ambiguity-resolution information for use in resolving an ambiguous identification of unidentified caller **14** as two or more known callers.

In one embodiment, the greeting generated at step **204** prompts unidentified caller **14** to select a destination for the call at step **206**. For example, and not by way of limitation, switching system **20** and associated automated attendant capability **26** may prompt unidentified caller **14** to select a call destination by playing a prerecorded message similar to the following: "Press or say '1' to be connected to our service department, press or say '2' to be connected to our order processing department, or stay on the line to speak with one of our customer service representatives." One or more agents **36** may each be associated with a particular call destination. As discussed below, switching system **20** may transfer the unidentified caller **14** to a particular agent **36** associated with the selected call destination at any appropriate time during the operation of system **8**.

Either before or after unidentified caller **14** selects a call destination at step **208**, switching system **20** prompts unidentified caller **14** at step **210** to provide an utterance, for example, any sound, word, or phrase, such as the name or account number of unidentified caller **14**, that is suitable for comparison with one or more stored utterance identifiers **164** corresponding to one or more known callers. Switching system **20** may prompt unidentified caller **14** to provide an

utterance using speech generation capability **24**, by playing a prerecorded message to unidentified caller **14**, such as "Whom may we say is calling?," or in any other suitable manner. At step **212**, unidentified caller **14** responds by providing the requested utterance. If the utterance provided by unidentified caller **14** is inaudible, improper, or unsatisfactory at step **214**, according to one or more specified parameters, the method returns to step **210**, where unidentified caller **14** is again prompted to provide an utterance. If the utterance is satisfactory at step **214**, switching system **20** digitizes the utterance at step **216** using analog-to-digital conversion facility **13** and records the digitized utterance at step **218** using recording facility **15**.

At step **220**, switching system **20** communicates the digitized utterance to system server **30** using link **32**. At step **222**, switching system **20** queues the incoming call pending the availability of an appropriate agent **36** to handle the incoming call, for example, a particular agent **36** associated with the call destination selected at step **208**. Switching system **20** may perform steps **220** and **222** more or less in parallel, such that the branch of the method beginning at step **220** proceeds more or less in parallel with the branch of the method beginning at step **222**. Referring to the branch beginning at step **220**, system server **30** receives the digitized utterance corresponding to unidentified caller **14** at step **224** and, at step **226**, communicates the digitized utterance to database server **34** for comparison with utterance identifiers **164** contained in database **42**, tables **160**, and records **44**. As discussed above, database server **34** may be integral to or separate from system server **30**.

At step **228**, database server **34** accesses database **42** using interface **41** and communication parameters **48**. At step **230**, database server **34** and DBMS **43** search database **42** for one or more utterance identifiers **164** that duplicate, resemble, match, correlate with, or otherwise compare favorably to the digitized utterance corresponding to unidentified caller **14**, according to one or more match parameters **46**. Alternatively, database server **34** may communicate one or more match parameters **46** to DBMS **43** in association with the key or other suitable identifier to allow DBMS **43** and database **42** to locate or otherwise identify one or more utterance identifiers **164** that duplicate, resemble, match, correlate with, or otherwise compare favorably to the digitized utterance corresponding to unidentified caller **14**.

In one embodiment, parametric encoding data **165** may be searched instead of, or in addition to, utterance identifiers **164** to identify unidentified caller **14**. The use of parametric encoding techniques in connection with the search may speed the searching process, because the storage size for parametric encoding data **165** may be smaller than the storage size for corresponding utterance identifier **164**. Furthermore, parametric encoding data **165** may be invariant with respect to factors used to identify unidentified caller **14**. As a result, database server **34** and associated DBMS **43** may handle less data in searching database **42** to identify the unidentified caller **14** as a particular known caller represented in database **42**.

One or more tables **160** may be searched serially, more or less simultaneously, or in any other suitable manner. One or more tables **160** may be selectively searched according to one or more characteristics of unidentified caller **14** or the utterance provided by unidentified caller **14**, such as the gender of unidentified caller **14**, the length of the utterance or corresponding digital representation, the average pitch of the utterance or corresponding digital representation, or other suitable characteristic. The present invention contemplates any suitable technique for comparing a digitized, parametric, or other representation of an utterance for unidentified caller **14** with utterance identifiers **164** or parametric encoding data **165**, in any combination, for one or more known callers to identify unidentified caller **14** as a particular known caller.

The correlation between an utterance identifier **164** or parametric encoding data **165** and the digitized, parametric, or other representation of the utterance for unidentified caller **14** may be measured, assessed, calculated, or otherwise determined in any suitable manner. For example, parametric encoding techniques may allow database server **34** or another component of processing system **10** to generate one or more discrimination thresholds that may be used to determine whether the digitized utterance matches an utterance identifier **164** closely enough for unidentified caller **14** to be identified as the particular known caller corresponding to the utterance identifier **164**. Parametric encoding techniques may allow database server **34** or another component of processing system **10** to calculate, arrive at, or otherwise determine a figure of merit, using one or more merit parameters contained in match parameters **46**, a discrimination threshold, or other suitable factor, to indicate the certainty of an identification.

If a match is found for the digitized utterance corresponding to unidentified caller **14** at step **231**, database server **34** may measure, assess, calculate, or otherwise determine a figure of merit for the match at step **232**. If the identification of unidentified caller **14** is ambiguous at step **233**, in that the digitized utterance for unidentified caller **14** matches utterance data **162** for two or more known callers at step **231**, database server **34** searches records **44** for these known callers at step **234** for information that matches, correlates with, or is otherwise consistent with the identifier determined at step **205**, according to appropriate parameters. Database server **34** may search records **44** for these known callers serially, simultaneously, or in another manner. Unidentified caller **14** is identified at step **235** as the known caller for which records **44** contain information most consistent with the identifier determined at step **205** or most consistent with information determined using the identifier, resolving the ambiguity.

For example, if unidentified caller **14** is calling from the telephone number "(214) 555-1212" and facility **17** identifies the area code "214" and the office code "555" as ambiguity-resolution information at step **205**, database server **34** searches records **44** corresponding to the two or more known callers at step **234** for one or more ambiguity-resolution criteria consistent with this information. In one embodiment, consistent ambiguity-resolution criteria may be contained in table **100** as identical, geographically associated, or other consistent area code and office code communications identifiers **114** for a particular known caller. In this case, the known caller for which the area code, office code, or both area code and office code communications identifiers **114** are consistent with the selected ambiguity-resolution information is the known caller with which formerly unidentified caller **14** is identified at step **235**.

To increase speed and conserve processing capability, processing system **10** may use as few ambiguity-resolution criteria as necessary to identify unidentified caller **14** as a particular known caller. For example, if records **44** in table **100** for two or more known callers contained identity data **104** consistent with the area code ambiguity-resolution information "214," then office code ambiguity-resolution criterion "555" would be used to resolve the ambiguity if possible. Similarly, if records **44** in table **100** for two or more known callers contained identity data **104** consistent with

office code ambiguity-resolution information "555," an IP address ambiguity-resolution criterion might be used to resolve the ambiguity if possible. The present invention contemplates using as many ambiguity-resolution criteria, serially or in any other suitable manner, as necessary to adequately identify unidentified caller **14** as a particular known caller. In one embodiment, as discussed below, if suitable information concerning an ambiguous identification is provided to agent **36**, agent **36** may participate in the ambiguity-resolution process.

At step **236**, database server **34** and associated DBMS **43** retrieve information from database **42** corresponding to the known caller with which formerly unidentified caller **14** has been identified. The retrieved information may include some or all of the identity data **104**, order data **132**, or utterance data **162** for the known caller, banking, purchase, account or other data for the known caller, or any other information associated with the known caller and contained in database **42**. Database server **34** communicates the retrieved information to system server **30** at step **238**. At step **240**, system server **30** communicates some or all of the retrieved information to an appropriate agent **36** in coordination with information received from switching system **20**, as discussed below in connection with the branch of the method beginning at step **222**.

At step **222**, switching system **20** queues the incoming call from unidentified caller **14** pending the availability of an appropriate agent **36** to handle the incoming call. If an appropriate agent **36** is not available at step **242**, the method loops until an appropriate agent becomes available. If an appropriate agent **36** is available at step **242**, for example, a selected agent **36** associated with the call destination provided by unidentified caller **14** at step **208**, then switching system **20** transfers the incoming call to selected agent **36** at step **244**. At step **246**, switching system **20** communicates the identity, location, network address, or other suitable routing or communication information concerning selected agent **36** to system server **30**. System server **30** then communicates the retrieved information to selected agent **36** in some suitable manner at step **240**. In one embodiment, if unidentified caller **14** has been ambiguously identified as two or more known callers, agent **36** may be provided with this information to allow agent **36** to assist in the ambiguity-resolution process, for example, by selecting a particular known caller based on one or more suitable parameters known or made available to agent **36**.

Coordinating and synchronizing the identification of selected agent **36** using switching system **20**, the identification of unidentified caller **14** as a particular known caller, the retrieval of information corresponding to the known caller from database **42**, and the communication, delivery, or presentation of the information to selected agent **36** may be accomplished using any suitable technique. Such techniques may include, for example, and not by way of limitation: the technique disclosed in U.S. Pat. No. 5,309,504, which is incorporated by reference herein; one or more techniques according to a TSAPI specification; one or more techniques according to a telecommunications system provider's proprietary interface; or any other suitable "screen popping" or other technique. In one embodiment, switching system **20** and system server **30** are integrated to more easily coordinate and synchronize the identification of selected agent **36**, the identification of unidentified caller **14** as a particular known caller, and the communication of retrieved information concerning the known caller to the selected agent **36**.

As discussed above, database server **34** or another component of processing system **10** may calculate or otherwise determine a figure of merit to indicate the extent of the correlation or the certainty of the match between the digitized utterance for formerly unidentified caller **14** and the utterance identifier **164** for the particular known caller with which formerly unidentified caller **14** has been identified. In one embodiment, the figure of merit is communicated to selected agent **36** along with the retrieved information for the particular known caller. If either a figure of merit has not been provided at step **248**, or has been provided at step **248** and is deemed acceptable by selected agent **36** at step **250**, in accordance with one or more specified parameters, the method proceeds directly to step **254**, where selected agent **36** interacts with formerly unidentified caller **14** in some suitable manner according to the needs of the caller or the organization. If a figure of merit has been provided at step **248**, but is not deemed acceptable by selected agent **36** at step **250**, selected agent **36** may interactively verify the identity of formerly unidentified caller **14** according to conventional techniques at step **252**. After selected agent **36** handles the call in some suitable manner at step **254**, the method ends.

If processing system **10** is unable to match or suitably correlate the digitized utterance for unidentified caller **14** with an utterance identifier **164** corresponding to a known caller at step **231**, or is unable to suitably resolve an ambiguous identification or unidentified caller **14** as two or more known callers at step **235**, the agent **36** selected by switching system **20** may interactively verify the identify of unidentified caller **14** using conventional techniques at step **256**. In one embodiment, the present invention is self-learning, such that if no match has been made at step **231** and unidentified caller **14** is identified interactively at step **256**, system **8** may receive and store information for formerly unidentified caller **14** for use in identifying subsequent unidentified callers **14**. For example, database **42** may not contain utterance data **162** to identify unidentified caller **14** when unidentified caller **14** calls the organization, because unidentified caller **14** may have had no previous interaction with the organization. Furthermore, database **42** may not yet contain utterance data **162** for any known callers, due to the length of time system **8** has been operating or for any other reason.

At step **258**, processing system **10** may create a record **44** for formerly unidentified caller **14** containing an utterance identifier **164** and other utterance data **162** generated using the utterance provided at step **212**. At step **260**, the created record **44** for formerly unidentified caller **14** may be stored in one or more tables **160** within database **42**. The created record **44** for formerly unidentified caller **14** may be associated with identity data **104**, order data **132**, or utterance data **162**, banking, purchase, or account data, or other information concerning formerly unidentified caller **14**, whether the information is generated before, during, or after the record **44** is created. In one embodiment, the created record **44** will correspond to a known caller for purposes of identifying subsequent unidentified callers **14** from among a universe of known callers. Before, during, or after storing the created record **44** at step **260**, selected agent **36** handles the call in some suitable manner at step **254** and the method ends.

FIGS. **5***a* and **5***b* represent a flow chart of a method of identifying an unidentified caller **14** in a voice messaging environment. The method begins at step **300**, where an unidentified caller **14** places a call to the organization using network **12** and link **22**. Although the present invention contemplates system **9** receiving and processing incoming calls from multiple unidentified callers **14** serially, more or

less simultaneously, or in any other temporal relationship, the method is discussed herein with reference to a single unidentified caller **14**. Voice messaging system **60** receives the incoming call from unidentified caller **14** at step **302** and, at step **304**, determines whether unidentified caller **14** can be identified using one or more conventional techniques. For example, if the incoming call originates from an extension, location, site, account, mail station, or other entity that is integral to voice messaging system **60**, such as a computer terminal coupled to an organization PBX, then voice messaging system **60** may identify unidentified caller **14** using information provided by unidentified caller **14** during the sign on process.

If voice messaging system **60** identifies unidentified caller **14** at step **304**, based on the origin of the incoming call or otherwise, then the method proceeds to step **330**, where voice messaging system **60** prompts unidentified caller **14** to provide a message for subsequent communication to a user of voice messaging system **60**. If voice messaging system **60** does not identify unidentified caller **14** at step **304**, for whatever reason, then voice messaging system **60** generates a greeting for communication to unidentified caller **14** at step **306** in the manner discussed above in connection with FIGS. **4***a* and **4***b*. Before, during, or after generating the greeting at step **306**, voice messaging system **60** may use facility **17** to determine a suitable identifier at step **307** for use in resolving an ambiguous identification of unidentified caller **14** as two or more known callers in the manner discussed above with reference to FIGS. **4***a* and **4***b*. In one embodiment, the greeting generated at step **306** prompts unidentified caller **14** at step **308** to provide an utterance, for example, any sound, word, or phrase, such as a name or other identifier corresponding to unidentified caller **14**, that is suitable for comparison with one or more utterance identifiers **164** corresponding to one or more known callers and stored using database **42** and tables **160**.

At step **310**, unidentified caller **14** responds by providing the requested utterance. If the utterance is inaudible, improper, or otherwise unsatisfactory at step **312**, according to one or more specified parameters, the method returns to step **308**, where unidentified caller **14** is again prompted to provide an utterance. If the provided utterance is satisfactory at step **312**, voice messaging system **60** digitizes the utterance at step **314** using analog-to-digital conversion facility **13** and records the utterance at step **316** using recording facility **15**. Voice messaging system **60** communicates the digitized utterance to database server **34** at step **318** using link **32**.

At step **320**, database server **34** accesses database **42** using interface **41** and communication parameters **48**. At step **322**, database server **34** and associated DBMS **43** search database **42** for one or more utterance identifiers **164** that duplicate, resemble, match, correlate with, or otherwise compare favorably to the digitized utterance corresponding to unidentified caller **14**, according to one or more match parameters **46**. As discussed above with reference to FIGS. **4***a* and **4***b*, parametric encoding data **165** may be searched instead of, or in addition to, utterance identifiers **164** to identify unidentified caller **14** from among a universe of known callers. If the digitized utterance corresponding to unidentified caller **14** matches an utterance identifier **164** at step **324**, database server **34** may measure, assess, calculate, or otherwise determine a figure of merit for the identification of formerly unidentified caller **14** at step **326** in the manner discussed above. Voice messaging system **60** may use any appropriate ambiguity-resolution criteria in identifying unidentified caller **14** as a particular known caller, as discussed more fully above with reference to FIGS. **4***a* and **4***b*.

At step **327**, database server **34** and associated DBMS **43** retrieve information from database **42** corresponding to the known caller with which formerly unidentified caller **14** has been identified. The retrieved information may include some or all of the identity data **104** for the known caller, such as a name or other identifier **106** for the known caller, or any other information associated with the particular known caller and contained in database **42**. Database server **34** communicates the retrieved information to voice messaging system **60** at step **328**. In one embodiment, the figure of merit determined at step **326** is communicated to voice messaging system **60** together with or separately from the retrieved information.

At step **330**, voice messaging system **60** prompts formerly unidentified caller **14** to provide a message for subsequent communication to a user of voice messaging system **60**. Voice messaging system **60** records any resulting message at step **332**, associates the identity of formerly unidentified caller **14** with the recorded message at step **334**, and stores the associated identity and recorded message corresponding to formerly unidentified caller **14** at step **336**. Voice messaging system **60** may prompt the caller to provide and may record a message before, during, or after the caller provides an utterance for identification purposes. When a user of voice messaging system **60** accesses voice messaging system **60** at step **358**, using a telephone connection, an integrated computer system, or in some other suitable manner, voice messaging system **60** may communicate the identity of formerly unidentified caller **14** to the user to indicate that formerly unidentified caller **14** recorded a message using voice messaging system **60**.

The present invention contemplates associating the identity of formerly unidentified caller **14** with the recorded message corresponding to formerly unidentified caller **14** before, during, or after the user accesses voice messaging system **60**. Voice messaging system **60** may provide the identity of formerly unidentified caller **14** separately from or together with the recorded message corresponding to formerly unidentified caller **14**. If multiple unidentified callers **14** have interacted with voice messaging system **60** to provide messages for a user, voice messaging system **60** may provide the user with the identities of the formerly unidentified callers **14** at step **360**, in a chronological list or other suitable format, separately from or together with the recorded messages corresponding to the formerly unidentified callers **14**.

Voice messaging system **60** may provide the identities and any other information retrieved from database **42** for one or more formerly unidentified callers **14** to the user in any appropriate manner. For example, if voice messaging system **60** is integral to, associated with, or suitably connected to a computer or other processing device such as computer **50**, then voice messaging system **60** may provide some or all of the retrieved information using output device **54** or another device suitable for conveying visual information. Alternatively, if voice messaging system **60** is accessed using a telephone only connection, for example, by the user entering a voice mail box number, PBX extension, or other identifier, voice messaging system **60** may audibly convey the retrieved information, in whole or in part. The present invention contemplates any suitable combination of such techniques to provide the identities of one or more formerly unidentified callers **14** for which messages have been recorded to a user of voice messaging system **60**.

Voice messaging system **60** may provide the identities of one or more formerly unidentified callers **14**, in a chronological list format or otherwise, together with other retrieved or other information concerning formerly unidentified callers **14**, the recorded messages corresponding to formerly unidentified callers **14**, or any combination of the above. For example, for a recorded message corresponding to formerly unidentified caller **14**, voice messaging system **60** might provide, in any suitable relative arrangement, without limitation: the identity of formerly unidentified caller **14**; the figure of merit associated with the identification of formerly unidentified caller **14**; the total number of recorded messages corresponding to formerly unidentified caller **14**; the length of the message; the time, day, and/or date the message was recorded; and any other suitable information concerning formerly unidentified caller **14** or the particular recorded message. Once the user accesses voice messaging system **60** and receives the identities of formerly unidentified callers **14** and any other appropriate information at step **360**, the method ends.

In one embodiment, system **9** is self-learning, such that if no match is made at step **324** between the utterance provided by unidentified caller **14** and an utterance identifier **164** corresponding to a known caller, system **9** creates a record **44** for the unidentified caller **14** that may be used to identify a subsequent unidentified caller **14** as the unidentified caller **14** corresponding to the created record **44**. For example, database **42** may not contain utterance data **162** suitable to identify unidentified caller **14**, because unidentified caller **14** may have had no previous interaction with the organization or voice messaging system **60**. Moreover, database **42** may not yet contain utterance data **162** for any known callers, due to the length of time system **9** has been operating or for some other reason. If the identity of unidentified caller **14** is verified in some suitable manner after the created record **44** is generated, the created record **44** for unidentified caller **14** may be used as a record **44** that corresponds to a known caller to identify one or more subsequent unidentified callers **14** in the manner discussed above.

If voice messaging system **60** cannot or does not match or suitably correlate the digitized utterance for unidentified caller **14** with an utterance identifier **164** corresponding to a known caller at step **324**, for whatever reason, voice messaging system **60** may prompt unidentified caller **14** to provide an utterance at step **338** in the manner discussed above with reference to step **308**. The present invention contemplates voice messaging system **60** using the utterance provided at step **308** instead of, or in addition to, prompting unidentified caller **14** for an utterance at step **338**. Unidentified caller **14** provides the requested utterance at step **340** and, if the utterance is satisfactory at step **342**, voice messaging system **60** digitizes and records the utterance at steps **344** and **346**, respectively. In one embodiment, voice messaging system **60** may also translate the utterance into a format understandable to system **9** using the associated speech recognition capability **23**. If the provided utterance is not satisfactory at step **342**, the method returns to step **338**, where unidentified caller **14** is again prompted to provide an utterance.

Before or after unidentified caller **14** is prompted to provide an utterance at step **338**, voice messaging system **60** prompts unidentified caller **14** to provide a message at step **348** for subsequent communication to a user of voice messaging system **60**. Voice messaging system **60** records any resulting message at step **350** and associates the utterance, the translated utterance, or both the utterance and translated utterance for unidentified caller **14** with the recorded message at step **352**. In conjunction with database server **42** and associated DBMS **43**, voice messaging system **60** creates a record **44** for unidentified caller **14** at step **354** and, at step **356**, stores the created record **44** in one or more tables **160** within database **42**. In one embodiment, the created record **44** for unidentified caller **14** contains an utterance identifier **164** that digitally represents the utterance provided by unidentified caller **14**. One or more created records **44** may also contain other utterance data **162** corresponding to the utterance and any other suitable information, whether or not associated with utterance identifier **164**.

In one embodiment, the recorded utterance or the translation of the utterance for unidentified caller **14** is used to indicate to a user of voice messaging system **60** that a message corresponding to unidentified caller **14** has been recorded. The created record **44** for unidentified caller **14** is used to identify a subsequent unidentified caller **14** as the particular unidentified caller **14** for which the created record **44** was generated.

When a user of voice messaging system **60** accesses voice messaging system **60** at step **358**, voice messaging system **60** may communicate the utterance, the translated utterance, and any other suitable information concerning unidentified caller **14** to the user at step **360** using any of the techniques discussed above. For example, if voice messaging system **60** is integral to, associated with, or suitably connected to a computer or other processing device such as computer **50**, then voice messaging system **60** may provide a translation of the utterance, generated using speech recognition capability **23**, to the user using output device **54** or another device suitable for conveying visual information. Alternatively, if voice messaging system **60** is accessed using a telephone only connection, for example, by the user entering a voice mail box number, PBX extension, or other identifier, voice messaging system **60** may audibly convey the utterance to the user.

Voice messaging system **60** may provide utterances or translated utterances for one or more unidentified callers **14**, in a chronological list format or otherwise, together with or separately from: any other suitable information concerning unidentified callers **14**; the recorded messages corresponding to unidentified callers **14**; the identities of formerly unidentified callers **14**; any other information concerning formerly unidentified callers **14**; the recorded messages corresponding to formerly unidentified callers **14**; or any combination of the above. After system **9** has provided this information to the user at step **360**, the method ends.

FIG. **6** illustrates an exemplary computer-based system **70** for identifying an unidentified caller **14** that includes network **12**, switching system **20**, and processing system **72**. Processing system **72** may include, without limitation: a control module (CONTROL) **74**, a match module (MATCH) **76**, a voice board **78**, recording facility **15**, facility **17**, speech generation capability **24**, voice messaging capability **25**, automated attendant capability **26**, match parameters **46**, communications parameters **48**, database **42**, and any other suitable components. In one embodiment, processing system **72** operates on a called party's personal or other computer **50** in a home setting, business or other organizational setting, or any other suitable environment to provide some or all of the functionality discussed above with reference to FIG. **1**. The present invention contemplates: some or all of switching system **20** being integral to computer **50**; processing system **72** distributed to operate on multiple computers **50** or telephone units at one or more locations; components of processing system **72**, such as database **42**, being integral to or separate from processing system **72**; or processing system

72, computer 50, switching system 20, or any combination of the above being integral to a called party's telephone unit. Those skilled in the art will appreciate that other suitable arrangements may be devised without departing from the intended scope of the present invention.

Voice board 78 includes appropriate circuitry for detecting ringing signals or other call origination signals and for performing analog-to-digital or digital-to-analog conversion, as the case may be. Voice board 78 is of a type well known in the art and may be in the form of a computer-oriented modem, in the form of a specialized voice board of the type manufactured by DIALOGIC CORPORATION or RHETORIX CORPORATION and used for computer telephony integration (CTI), or in any other suitable form. Voice board 78 may replace or combine with analog-to-digital conversion facility 13 shown in FIG. 1. Analog-to-digital conversion may alternatively be performed using capabilities associated with switching system 20. Match module (MATCH) 76 performs functionality discussed above with reference to FIG. 1 for identifying unidentified callers 14 by comparing utterance information for unidentified callers 14 with stored utterance data 162 for known callers. Control module (CONTROL) 74 coordinates communications between various components of processing system 72 according to the operation of processing system 72 and system 70. Using the capabilities discussed above, system 70 identifies one or more unidentified callers 14 and, in response, provides one or more call routing options to a called party. System 70 may use ambiguity-resolution criteria in the manner discussed above with reference to FIGS. 4*a* and 4*b*. The present invention contemplates processing system 72 routing calls in a pre-programmed manner according to the identification of some or all unidentified callers 14.

FIGS. 7*a* through 7*d* illustrate option screens that processing system 72 may present to the called party using output device 54 of computer 50, a liquid crystal display (LCD) or light emitting diode (LED) display associated with a telephone unit, or in any other suitable manner according to the operation of processing system 72 and activities of the called party. FIG. 7*a* illustrates first option screen 80 that is presented to the called party in response to processing system 72 receiving an incoming call from unidentified caller 14, receiving an utterance from unidentified caller 14, and identifying unidentified caller 14 as a particular known caller, possibly using one or more ambiguity-resolution criteria. First option screen 80 includes textual information 82 that may include the date and time, the identify of formerly unidentified caller 14, an instructional or other message, and any other suitable information, in any combination. First option screen 80 also includes call routing options 84, which are presented to the called party in the form of window buttons, as shown in FIG. 7*a*, as numbered options, or in any other appropriate form. The present invention contemplates some or all of the information associated with first option screen 80 being presented to the called party audibly in addition to or instead of visually.

In one embodiment, call routing options 84 include: (1) an accept option 86 that the called party selects to accept the call from formerly unidentified caller 14; (2) a voice messaging option 87 that the called party selects to transfer the call or otherwise leave a message to voice messaging capability 25; (3) an attendant option 88 that the called party selects to transfer the call to a secretary or other assistant or to automated attendant capability 26, as the case may be; (4) a disconnect option 89 that the called party selects to disconnect the call; and (5) any other call routing options 84. Voice messaging capability 25 may be a message recording facility either collocated with or remote from the called party and the associated computer 50 or telephone unit. Collectively, voice messaging option 87 and attendant option 88 may be referred to as transfer option 90. The functionality associated with attendant option 88 may be separated among multiple transfer options 90. The called party may select from among call routing options 84 using a mouse or other suitable pointer to select an appropriate window button on output device 54, using a keyboard such as input device 52 of computer 50 to enter an appropriate number or letters, or using any other suitable technique for indicating a selection. Processing system 72 may route calls from one or more formerly unidentified callers 14 according to pre-programmed routing information in response to identifying unidentified callers 14 as known callers.

FIG. 7*b* illustrates second option screen 92 that is presented to the called party in response to the called party selecting accept option 86 associated with first option screen 80. Similar to first option screen 80, second option screen 92 includes textual information 82 and suitable call routing options 84, which may include voice messaging option 87, attendant option 88, disconnect option 89, and any other appropriate call routing options 84. As a result, the called party maintains real-time control over the call even after accepting the call, which provides an important technical advantage of the present invention. As discussed above, the called party may select from among call routing options 84 using a mouse or other suitable pointer to select an appropriate window button on output device 54, using a keyboard such as input device 52 of computer 50 to enter an appropriate number or letters, or using any other suitable technique.

In one embodiment, second option screen 92 includes textual information 82 that instructs the called party to provide a corrected identity if the formerly unidentified caller 14 was identified incorrectly, because the formerly unidentified caller 14 provided an utterance sufficiently different from one or more previous utterances for formerly unidentified caller 14 or for any other reason. For example, and not by way of limitation, unidentified caller 14 may have a changed name, a medical or other condition, or a relatively poor transmission facility. After the called party types, speaks, or otherwise enters or provides a corrected identity, assuming one is necessary, the called party may cause processing system 72 to store the corrected identity of formerly unidentified caller 14 with utterance information that processing system 72 used to incorrectly identify the formerly unidentified caller 14 in database 42, as name 106 and corresponding utterance identifier 164. The called party may use a store window button 94 on output device 54, keys on input device 52, or any other suitable technique to store the corrected identity and utterance information.

FIG. 7*c* illustrates third option screen 96 presented to the called party in response to processing system 72 receiving an incoming call from unidentified caller 14, receiving an utterance from unidentified caller 14, and being unable to adequately identify unidentified caller 14 or to resolve an ambiguous identification of unidentified caller 14 using appropriate criteria. Similar to first option screen 80, third option screen 96 includes textual information 82 and suitable call routing options 84, which may include accept option 86, voice messaging option 87, attendant option 88, disconnect option 89, and any other appropriate call routing options 84. In one embodiment, textual information 82 may explain to the called party that the called party may register the identity of unidentified caller 14 after selecting accept

option **86** and identifying unidentified caller **14** through personal interaction, as discussed more fully below.

FIG. **7***d* illustrates fourth option screen **98** that is presented to the called party in response to the called party selecting accept option **86** associated with third option screen **96**. Similar to second option screen **92**, fourth option screen **98** includes textual information **82** and appropriate call routing options **84**, which may include voice messaging option **87**, attendant option **88**, disconnect option **89**, and any other appropriate call routing options **84**. As discussed above, the called party maintains real-time control over the call even after accepting the call, providing an important technical advantage of the present invention. In one embodiment, fourth option screen **98** includes textual information **82** that instructs the called party to provide the identity of unidentified caller **14** for registering unidentified caller **14** with processing system **72**. Textual information **82** may also invite the called party to select a name from a list **97** of known callers who might possibly be unidentified caller **14**, based upon the similarity of the utterance information for unidentified caller **14** to stored utterance identifiers **164** for the known callers, but for whom no match could be made to within the predetermined accuracy threshold. As discussed above, one or more ambiguity-resolution criteria may be used to further narrow the universe of known callers with which unidentified caller **14** may be identified.

After the called party provides the identity of unidentified caller **14** or selects the identity of a known caller from list **97**, the called party may cause processing system **72** to store the identity as a new name **106** in table **160** with the utterance information for unidentified caller **14** or, if a known caller is selected from list **97**, to store the utterance information as an utterance identifier **164** associated with name **106** for the known caller. The called party may register the formerly unidentified caller **14** using a store window button **99** on output device **54**, keys of input device **52**, or any other suitable technique. The called party may also select a cancel window button **91** or otherwise indicate that the called party does not wish to register formerly unidentified caller **14** with processing system **72**. As the above discussion indicates, the present invention may be self-learning to increase the likelihood that processing system **72** will correctly identify the formerly unidentified caller **14** the next time the formerly unidentified caller **14** calls.

FIGS. **8***a* and **8***b* are a flow chart illustrating an exemplary method of identifying an unidentified caller **14**. The method begins at step **400**, where unidentified caller **14** places a call to the called party, who may be in a home, business or organizational, or any other suitable setting, using network **12** and link **22**. Although system **70** may receive and process calls from one or more unidentified callers **14** serially, more or less simultaneously, or in any other temporal relationship, the method is discussed with reference to a single unidentified caller **14**. At step **402**, switching system **20** receives the incoming call and, at step **404**, routes the call to voice board **78** of processing system **72**. In response to receiving the incoming call at step **402**, system **70** also determines one or more identifiers at step **405** for use as ambiguity-resolution information in the manner discussed above. Voice board **78** audibly prompts unidentified caller **14** to provide an utterance at step **406** and, at step **408**, unidentified caller **14** provides the requested utterance. As discussed above, the utterance may be any sound, word, or phrase, such as the name of unidentified caller **14**, suitable for being digitized and compared with previously stored utterance identifiers **164** corresponding to one or more known callers.

If the utterance provided by unidentified caller **14** at step **408** is inaudible, improper, or unsatisfactory at step **410**, according to one or more specified parameters, the method returns to step **406**, where voice board **78** again prompts unidentified caller **14** to provide an utterance. If the utterance is satisfactory at step **410**, voice board **78** digitizes the utterance at step **412** and processing system **72** records the digitized utterance for unidentified caller **14** at step **414** using recording facility **15**. At step **416**, match module **76** of processing system **72** attempts to match the digitized utterance for unidentified caller **14** with an utterance identifier **164** contained in database **42** in the manner discussed more fully above. One or more ambiguity-resolution criteria may be used. If a match is found for the digitized utterance at step **418**, processing system **72** presents first option screen **80** and the associated call routing options **84** to the called party at step **420**, using output device **54** of computer **50**, an LCD or LED display associated with the called party's telephone unit, audibly using a speaker or "head set" associated with computer **50**, or in any other appropriate manner.

If the called party accepts the call at step **422**, for example, by selecting accept option **86** using a mouse or other pointer, keys on input device **52** of computer **50**, or in any other suitable manner, processing system **72** connects the called party to formerly unidentified caller **14** at step **424**. Processing system **72** may connect unidentified caller **14** to the called party, for example, by coupling the phone line to a microphone and speakers associated with computer **50** or the called party's telephone unit, to a "head set" associated with computer **50** or the called party's telephone unit, or using any other appropriate technique. At step **426**, processing system **72** presents the called party with second option screen **92**, which may be presented as an entirely new screen on output device **54** or as a modified version of first option screen **80**.

If the called party does not accept the call at step **422**, and instead selects another call routing option **84** for the call, processing system **72** transfers or disconnects the call at step **432** according to the call routing option **84** selected, and the method ends. For example, if voice messaging option **87** is selected, formerly unidentified caller **14** is transferred to voice messaging capability **25** through a "switch hook transfer," telecommunications API (TAPI), TSAPI, or ISDN commands, or any other appropriate mechanism. If voice messaging system **25** is integral to computer **50**, transfer may be unnecessary and processing system **72** may invoke voice messaging capability **25** more or less directly. Alternatively, if the called party selects attendant option **88**, formerly unidentified caller **14** is routed to an assistant, to automated attendant capability **26**, or to any other suitable predetermined destination. As discussed above, this transfer may be performed according to a "switch hook transfer" or standard commands. Another alternative for the called party is to select disconnect option **89** to disconnect the call. The present invention contemplates other call routing options **84** as alternatives to accept option **86**. Processing system **72** may also route calls from some or all unidentified callers **14** according to pre-programmed call routing information in response to the identification of unidentified callers **14**.

If formerly unidentified caller **14** has been identified in error at step **434**, for whatever reason, the called party may provide a corrected identity at step **436** and store the corrected identity with the utterance information for the formerly unidentified caller **14** at step **438**, using store window button **94** or any other suitable technique, as name **106** and corresponding utterance identifier **164** in database **42**. Since the called party maintains real-time control over

the call even after accepting the call, the called party may select a transfer option **90** or disconnect option **89** at step **440** according to particular needs, in which case the method proceeds to step **432**. Alternatively, the call may proceed at step **442** until terminated in some manner at step **444**, for example, when the call reaches its natural conclusion and the called party hangs up, in which case the method ends. Steps **440** through **444** are repeated more or less continually until the called party transfers the call, disconnects the call, or the call is terminated in some other manner. If formerly unidentified caller **14** was not identified in error at step **434**, the method proceeds to step **440** directly. Steps **434** through **444** may occur in any relative sequence according to the operation of processing system **72** and the actions of the called party.

If processing system **72** is unable to find a match or resolve an ambiguous identification at step **418**, processing system **72** presents third option screen **96** and associated call routing options **84** to the called party using output device **54** or in any other suitable manner at step **428**. If the called party selects a transfer option **90** or disconnect option **89** rather than selecting accept option **86** at step **430**, then processing system **72** transfers or disconnects the call at step **432** according to the selected call routing option **84**, and the method ends. If the called party selects accept option **86** at step **430**, processing system **72** presents the called party with fourth option screen **98** at step **446**. If fourth option screen **98** includes a list **97** of one or more known callers for which utterance identifiers **164** possibly match the utterance information for the formerly unidentified caller **14** at step **448**, and one of the known callers is in fact the formerly unidentified caller **14**, the called party may select the identity of a particular known caller at step **450**. At step **452**, the called party may store the utterance information for the formerly unidentified caller **14** with name **106** for the corresponding known caller in database **42**, and the method proceeds to step **440**, where the called party may exercise real-time control over the call by selecting a call routing option **84**.

If fourth option screen **98** does not include a list **97** of one or more known callers for which stored utterance identifiers **164** possibly match the utterance information for formerly unidentified caller **14**, or if no known caller in list **97** is in fact the formerly unidentified caller **14**, the called party may register formerly unidentified caller **14** with processing system **72** at step **454**. The called party may type, speak, or otherwise enter the identity of the formerly unidentified caller **14** at step **456** and, at step **458**, may store the utterance information for the formerly unidentified caller **14** with the identity of the formerly unidentified caller **14** in database **42** as name **106** and corresponding utterance identifier **164**. The method then proceeds to step **440**, where the called party may exercise real-time control over the call. If the called party does not elect to register the formerly unidentified caller **14** with processing system **72** at step **454**, the method proceeds directly to step **440**.

FIG. **9** illustrates an exemplary system **500** for identifying one or more unidentified customers **510** at the point of sale. System **500** includes one or more processing systems **502**, each operating on a computer **50** and coupled to a voice input device **512**, to database **42**, and possibly to an agent **36**. Voice input device **512** may be a telephone coupled to system **500** using an appropriate network, a microphone, or other suitable voice input device. Agents **36** are discussed more fully above and may be autonomous or operated by one or more employees, representatives, operators, or other individuals associated with the establishment or organization that may interact in some manner with unidentified customers **510** before, during, and after the identification process.

Each processing system **502** includes, without limitation: control module **74**, match module **76**, analog-to-digital conversion facility **13**, recording facility **15**, a conventional or other suitable speech recognition facility (SR) **23** of the type known to those skilled in the art, speech generation capability **24**, match parameters **46**, communications parameters **48**, interface **41**, and any other components discussed above. Using these and any other suitable components, system **500** identifies one or more unidentified customers **510** at the point of sale from among a universe of known customers, using one or more ambiguity-resolution criteria if appropriate, to provide access to goods, services, and any other suitable benefits. In a particular embodiment, some or all of the components of system **500**, such as voice input device **512**, processing system **502**, agent **36**, and database **42**, may be integral to an automated teller machine (ATM) that dispenses currency to, receives deposits from, and provides any other suitable banking transactions for patrons of a corresponding banking establishment.

In one embodiment, each processing system **502** within system **500** operates on one or more computers **50** at a particular point of sale to provide functionality discussed above with reference to FIG. **1**. Database **42** may be replicated in whole or in part at each point of sale or may be located remotely from processing systems **502** at a centralized location, for example, a centralized point of sale or organizational headquarters. The present invention contemplates multiple processing systems **502** at multiple points of sale operating on the same distributed computer **50** and contemplates database **42** being integral to or separate from one or more processing systems **502**. When database **42** is remote from processing system **502**, processing system **502** communicates with database **42** using interface **41** and any suitable wireline or wireless link **506**, as discussed above.

For purposes of this discussion, a point of sale may include any commercial or other establishment or location, or portion thereof, at which one or more customers **510** may purchase, rent, otherwise receive, or order a tangible or intangible item, for example, a good, service, or other benefit. For example, the point of sale associated with a particular processing system **502** may be a video rental point of sale, a grocery store point of sale, a banking point of sale, such as an ATM point of sale, a department store point of sale, a gasoline station point of sale, a dry cleaning point of sale, or any other appropriate point of sale. Moreover, the point of sale may be a Social Security Administration point of sale, a Department of Health and Human Services point of sale, Federal job training center point of sale, or other point of sale at which monetary or other governmental benefits are provided. Recipients of such benefits are considered customers for purposes of this discussion.

A single establishment or location, such as a large department store, may include multiple points of sale, for example, at each cash register in the store. The point of sale may also be a telephone or personal computer in a home, business, or other suitable setting that includes the requisite components and from which items or other benefits may be purchased, rented, ordered, or otherwise requested. For example, unidentified customer **510** may call or dial in from a telephone or personal computer point of sale in the home to purchase an item, in which case the identification process may be performed at the point of sale, at the other end of the link associated with the organization from which the item is purchased, or at some other remote location. Those skilled

in the art will appreciate that system **500** may operate in connection with other suitable points of sale without departing from the intended scope of the present invention.

Communications from unidentified customers **510** to processing systems **502**, represented by arrows **504**, may be conventional speech communications, speech communications transmitted using an appropriate wireless communications technique, or any other suitable verbal communications. These communications are received at voice input device **512** and converted into electrical signals for use by processing system **502** in identifying unidentified customer **510** from among a universe of known customers at the point of sale. As discussed above, processing system **502** may perform the customer identification local to or remote from the point of sale.

FIGS. **10***a* and **10***b* are a flow chart illustrating an exemplary method of identifying one or more unidentified customers **510** at the point of sale. The method begins at step **550**, where agent **36** or another suitable component of system **500** may audibly or visually prompt unidentified customer **510** to provide an utterance at the point of sale. At step **552**, unidentified customer **510** provides the requested utterance. As discussed above, the utterance may be any sound, word, or phrase, such as the name of unidentified customer **510**, suitable for being digitized and compared with previously stored utterance identifiers **164** corresponding to one or more known customers. If the utterance that is provided by unidentified customer **510** at step **552** is inaudible, improper, or unsatisfactory at step **554**, in accordance with one or more specified parameters, the method returns to step **550**, where system **500** again prompts unidentified customer **510** to provide an utterance. If the utterance is satisfactory at step **554**, processing system **502** digitizes the utterance at step **556** and records the digitized utterance at step **558** in the manner discussed above.

At step **560**, processing system **502** attempts to match the digitized utterance for unidentified customer **510** with an utterance identifier **164** contained in database **42** in the manner discussed more fully above. If a match is found for the digitized utterance at step **562**, processing system **502** may measure, assess, calculate, or otherwise determine a figure of merit for the match at step **564**. In a particular embodiment, one or more ambiguity-resolution criteria in records **44** may be used at steps **565** and **566** to resolve an ambiguous identification of unidentified customer **510** as two or more known customers in the manner discussed above. Ambiguity-resolution criteria may also be used to verify an unambiguous identification of customer **510** as a particular known customer.

For example, at step **565**, system **70** may determine a location, number, or other identifier associated with a point of sale in a commercial establishment, government office, or other premises at which unidentified customer **510** seeks a good, service, or other benefit. At step **566**, system **70** compares the identifier determined at step **565** with an identifier **119** contained in records **44** for one or more known customers with which customer **510** has been identified. Customer **510** is identified as the particular known customer for which the identifier determined at step **565** is consistent with identifier **119**, thereby resolving the ambiguity or verifying the unambiguous identification. The goods, services, or benefits customer **510** is seeking may be compared with historical purchasing information **121** for one or more known customers to resolve an ambiguous identification or verify an unambiguous identification, as the case may be. The present invention contemplates using any suitable ambiguity-resolution criteria in connection with system **70** to perform these functions at the point of sale or remote from the point of sale.

At step **567**, processing system **502** and DBMS **43** cooperate to retrieve information from database **42** that corresponds to the known customer with which formerly unidentified customer **510** has been identified. Although identity data **104**, order data **132**, utterance data **162**, and other data contained in database **42** is discussed above in connection with callers, database **42** may contain analogous information for one or more known customers instead of or in addition to information concerning known callers.

The retrieved information may include some or all of the identity data **104**, order data **132**, or utterance data **162** for the known customer; banking, purchase, account or other data for the known customer; or any other suitable information associated with the known customer and contained in database **42**. In one embodiment, this other information retrieved from database **42** may include some or all of historical purchasing information **121** for formerly unidentified customer **510** that evidences or reflects dates; times; frequencies; amounts; brands; product types; a PIN, password, or other identifier used to authorize all or particular types of transactions; and any other historical purchasing information, in any combination. Although purchasing information is discussed, this infonmation may include any information associated with the provision or receipt of a tangible or intangible benefit, however such benefit is transferred, with or without consideration. The retrieved information is then provided to agent **36** at the point of sale at step **568** using any suitable "screen popping" or other technique discussed more fully above.

As discussed more fully above, processing system **502** may calculate or otherwise determine a figure of merit at step **564** to indicate the extent of the correlation or the certainty of the match between the digitized utterance for formerly unidentified customer **510** and the utterance identifier **164** for the particular known customer with which formerly unidentified customer **510** has been identified. In one embodiment, the figure of merit is communicated to agent **36** along with the retrieved information for the particular known customer. If either a figure of merit has not been provided at step **570**, or has been provided at step **570** and is deemed acceptable by agent **36** or processing system **502** at step **572** in accordance with one or more specified parameters, the method proceeds directly to step **574**, where agent **36** interacts with formerly unidentified customer **510** in some suitable manner at the point of sale according to the needs of the customer and the nature of the establishment. If a figure of merit has been provided at step **570**, but is not deemed acceptable at step **572**, agent **36** may interactively verify the identity of formerly unidentified customer **510** using conventional techniques at step **576**.

Whether or not a figure of merit is provided at step **570** or deemed acceptable at step **572**, processing system **502** or agent **36** may prompt formerly unidentified customer **510** at step **584** to provide a PIN, password, or other suitable identifier to authorize one or more transactions formerly unidentified customer **510** is trying to complete. For example, processing system **502** or agent **36** may require formerly unidentified customer **510** to enter a PIN, either manually or verbally, to authorize purchases that exceed a predetermined price threshold or include particular items. At step **586**, processing system **502** or agent **36** compares the provided PIN with a PIN previously stored in one or more records **44** in database **42** to authorize the purchases. A PIN,

password, or other suitable identifier may be required for all transactions or particular types of transactions according to particular needs.

In one embodiment, if a match is made at step **562**, whether or not a figure of merit is calculated or deemed acceptable, processing system **502** or agent **36** may also prompt formerly unidentified customer **510** to provide a security utterance at step **588**, such as the current time or date, that processing system **502** uses to provide further security and prevent fraud. For example, after formerly unidentified customer **510** has provided the current date as requested, processing system **502** uses speech recognition capability **23** to convert the security utterance to a form suitable for comparison at step **590** with time and date information that computer **50** maintains and updates more or less continuously during normal processing. If the current date that formerly unidentified customer **510** provided is correct at step **592**, it is much less likely that a person has simply previously recorded an utterance of formerly unidentified customer **510** and used this recorded utterance in an attempt to fraudulently obtain a good, service, or other benefit using system **500**. If the security utterance is not acceptable at step **592**, agent **36** may interact with formerly unidentified customer **510** as appropriate to verify the identification of formerly unidentified customer **510** as the known customer to reduce or eliminate the potential for fraud.

In addition to verifying the accuracy of the provided security utterance, processing system **502** may compare the security utterance with stored utterance data **162** for formerly unidentified customer **510** in order to verify the identification made at step **562** using the techniques discussed above. In one embodiment, a time or date such as described for the security utterance is the utterance prompted at step **550** and provided at step **552** for initially identifying unidentified customer **510** from among a universe of known customers, which provides additional security over an utterance, for example, that contains only the name of unidentified customer **510**.

The present invention also provides further security over previous systems, such as an ATM that requires users to input a magnetic card, because voice characteristics may change during an attempted robbery to the extent that no match can be made at step **562** and no good, service, or other benefit is provided. Processing system **502** may also use speech recognition facility **23** to recognize one or more predetermined distress, maintenance, or other utterances that prompt processing system **502** to alert or summon law enforcement authorities, maintenance personnel, or other appropriate persons or devices. Other security measures, including the use of ambiguity-resolution criteria to verify an identification, may be used without departing from the intended scope of the present invention. After agent **36** interacts with customer **510** in some suitable manner at step **574**, for example, to provide a good, service, or other benefit, or to decline to provide a good, service, or other benefit, the method ends.

If processing system **502** is unable to match or suitably correlate the digitized utterance for unidentified customer **510** with an utterance identifier **164** corresponding to a known customer at step **562**, or is unable to resolve an ambiguous identification at steps **565** and **566**, agent **36** may interactively verify the identity of unidentified customer **510** according to conventional techniques at step **578**. In one embodiment, the present invention is self-learning, such that if no match has been made at step **562** and unidentified customer **510** is identified interactively at step **578**, system **500** may receive and store information for unidentified customer **510** for use in identifying one or more subsequent unidentified customers **510**. For example, database **42** may not contain utterance data **162** to identify a particular unidentified customer **510** when unidentified customer **510** visits the establishment, for example, because unidentified customer **510** may have had no prior interaction with the establishment. Furthermore, database **42** may not yet contain utterance data **162** for any known customers, due to the length of time system **500** has been operating or for any other reason.

At step **580**, processing system **502** may create a record **44** for formerly unidentified customer **510** containing an utterance identifier **164** and other utterance data **162** generated using the utterance provided at step **552**. At step **582**, the created record **44** for formerly unidentified customer **510** may be stored in one or more tables **160** within database **42** to register formerly unidentified customer **510** with system **500**. The created record **44** for the formerly unidentified customer **510** may be associated with identity data **104**, order data **132**, or utterance data **162**; banking, purchase, or account data; or any other appropriate information concerning formerly unidentified customer **510**, such as purchasing information, whether the information is generated before, during, or after record **44** is created. In one embodiment, the created record **44** will correspond to a known customer for purposes of identifying subsequent unidentified customers **510** from among a universe of known customers at the point of sale. Before, during, or after storing the created record **44** at step **582**, agent **36** interacts with formerly unidentified customer **510** in some suitable manner at step **574**, for example, to provide a good, service, or other benefit, or to decline to provide a good, service, or other benefit if appropriate, and the method ends.

Although callers are discussed with reference to FIGS. **1** through **8***b* and customers are discussed with reference to FIGS. **9** and **10**, callers and customers may be collectively referred to as persons. References to persons are intended to include all such callers and customers. The present invention contemplates the use of one or more suitable ambiguity-resolution criteria for resolving an ambiguous identification of an unidentified person as two or more known persons, or for verifying an unambiguous identification of an unidentified person as a particular known person, in any of the ways discussed above.

Although the present invention has been described with several embodiments, a plethora of changes, substitutions, variations, alterations, transformations, and modifications may be suggested to one skilled in the art, and it is intended that the present invention encompass such changes, substitutions, variations, alterations, transformations, and modifications as fall within the spirit and scope of the appended claims.

What is claimed is:

1. A system for authenticating a caller before providing the caller with access to one or more secured resources, comprising:

stored voiceprint identification data that was stored during system enrollment of a plurality of known persons;

stored verification data that was stored during the system enrollment of the plurality of known persons; and

a processing system configured to

receive spoken identification information spoken in a current call initiated by a currently unidentified caller,

receive verification information from the current call that is independent of the spoken identification information,

generate a voiceprint associated with the currently unidentified caller from the spoken identification information,

automatically compare the voiceprint associated with the currently unidentified caller with the stored voiceprint identification data to identify the currently unidentified caller as at least one of the plurality of known persons, the currently unidentified caller a now identified caller,

automatically compare the verification information with the stored verification data for the at least one of the plurality of known persons to verify the identity of the now identified caller as a particular one of the plurality of known persons, the now identified caller a now identified and verified caller, and

authenticate the now identified and verified caller for access to the one or more secured resources in response to identifying and verifying the identity of the now identified and verified caller.

2. The system of claim **1**, wherein the processing system configured to automatically compare the verification information includes the processing system being configured to verify the identity of the now identified caller when the currently unidentified caller is identified as a specific one of the plurality of known persons.

3. The system of claim **1**, wherein the processing system configured to automatically compare the verification information includes the processing system being configured to narrow the identity of the now identified caller to the particular one of the plurality of known persons when the currently unidentified caller is identified as more than one of the plurality of known persons.

4. The system of claim **1**, wherein the verification information received by the processing system is spoken by the currently unidentified caller.

5. The system of claim **1**, wherein the verification information comprises a telephone number.

6. The system of claim **1**, wherein the processing system is further configured to determine the verification information according to a telephone number from which the currently unidentified caller is calling.

7. The system of claim **1**, wherein the verification information comprises at least a portion of a network address.

8. The system of claim **1**, wherein the verification information comprises a store identifier.

9. The system of claim **1**, wherein the verification information comprises historical purchasing information.

10. The system of claim **1**, wherein the processing system is further configured to automatically retrieve stored account or order information for the now identified and verified caller in response to authenticating the now identified and verified caller.

11. The system of claim **1**, wherein the processing system is further configured to route the current call to a destination in response to authenticating the now identified and verified caller.

12. A method for authenticating a caller before providing the caller with access to one or more secured resources, comprising:

receiving spoken identification information spoken in a current call initiated by a currently unidentified caller;

receiving verification information from the current call that is independent of the spoken identification information;

generating a voiceprint associated with the currently unidentified caller from the spoken identification information;

receiving stored voiceprint identification data that was stored during system enrollment of a plurality of known persons;

automatically comparing the voiceprint associated with the currently unidentified caller with the stored voiceprint identification data to identify the currently unidentified caller as at least one of the plurality of known persons, the currently unidentified caller a now identified caller;

receiving stored verification data that was stored during the system enrollment of the plurality of known persons;

automatically comparing the verification information with the stored verification data for the at least one of the plurality of known persons to verify the identity of the now identified caller as a particular one of the plurality of known persons, the now identified caller a now identified and verified caller; and

authenticating the now identified and verified caller for access to the one or more secured resources in response to identifying and verifying the identity of the now identified and verified caller.

13. The method of claim **12**, wherein automatically comparing the verification information includes verifying the identity of the now identified caller when the currently unidentified caller is identified as a specific one of the plurality of known persons.

14. The method of claim **12**, wherein automatically comparing the verification information includes narrowing the identity of the now identified caller to the particular one of the plurality of known persons when the currently unidentified caller is identified as more than one of the plurality of known persons.

15. The method of claim **12**, further comprising automatically retrieving stored account or order information for the now identified and verified caller in response to authenticating the now identified and verified caller.

16. The method of claim **12**, further comprising routing the current call to a destination in response to authenticating the now identified and verified caller.

17. Software for authenticating a caller before providing the caller with access to one or more secured resources, the software being embodied in computer-readable media and operable to:

receive spoken identification information spoken by a currently unidentified caller;

receive verification information that is independent of the spoken identification information;

generate a voiceprint associated with the currently unidentified caller from the spoken identification information;

receive stored voiceprint identification data that was stored during system enrollment of a plurality of known persons;

automatically compare the voiceprint associated with the currently unidentified caller with the stored voiceprint identification data to identify the currently unidentified caller as at least one of the plurality of known persons, the currently unidentified caller a now identified caller;

receive stored verification data that was stored during the system enrollment of the plurality of known persons;

automatically compare the verification information with the stored verification data for the at least one of the plurality of known persons to verify the identity of the now identified caller as a particular one of the plurality of known persons, the now identified caller a now identified and verified caller; and

authenticate the now identified and verified caller for access to the one or more secured resources in response to identifying and verifying the identity of the now identified and verified caller.

18. The software of claim **17**, wherein the software operable to automatically compare the verification information includes the software being operable to verify the identity of the now identified caller when the currently unidentified caller is identified as a specific one of the plurality of known persons.

19. The software of claim **17**, wherein the software operable to automatically compare the verification information includes the software being operable to narrow the identity of the now identified caller to the particular one of the plurality of known persons when the currently unidentified caller is identified as more than one of the plurality of known persons.

20. The software of claim **17**, further operable to automatically retrieve stored account or order information for the now identified and verified caller in response to authenticating the now identified and verified caller.

21. The software of claim **17**, further operable to route the current call to a destination in response to authenticating the now identified and verified caller.

22. A system for authenticating a caller before providing the caller with access to one or more secured resources, the system comprising a processor configured to:

receive spoken identification information spoken in a current call initiated by a currently unidentified caller;

receive verification information from the current call that is independent of the spoken identification information;

generate a voiceprint associated with the currently unidentified caller from the spoken identification information;

automatically compare the voiceprint associated with the currently unidentified caller with stored voiceprint identification data for a plurality of known persons to identify the currently unidentified caller as at least one of the plurality of known persons, the currently unidentified caller a now identified caller;

automatically compare the verification information with stored verification data for the at least one of the plurality of known persons to verify the identity of the now identified caller as a particular one of the plurality of known persons, the now identified caller a now identified and verified caller; and

authenticate the now identified and verified caller for access to the one or more secured resources in response to identifying and verifying the identity of the now identified and verified caller.

23. The system of claim **22**, wherein the processor configured to automatically compare the verification information includes the processor being configured to verify the identity of the now identified caller when the currently unidentified caller is identified as a specific one of the plurality of known persons.

24. The system of claim **22**, wherein the processor configured to automatically compare the verification information includes the processor being configured to narrow the identity of the now identified caller to the particular one of the plurality of known persons when the currently unidentified caller is identified as more than one of the plurality of known persons.

25. The system of claim **22**, wherein the verification information received by the processor is spoken by the currently unidentified caller.

26. The system of claim **22**, wherein the verification information comprises a telephone number.

27. The system of claim **22**, wherein the processor is further configured to determine the verification information according to a telephone number from which the currently unidentified caller is calling.

28. The system of claim **22**, wherein the verification information comprises at least a portion of a network address.

29. The system of claim **22**, wherein the verification information comprises a store identifier.

30. The system of claim **22**, wherein the verification information comprises historical purchasing information.

31. The system of claim **22**, wherein the processor is further configured to automatically retrieve stored account or order information for the now identified and verified caller in response to authenticating the now identified and verified caller.

32. The system of claim **22**, wherein the processor is further configured to route the current call to a destination in response to authenticating the now identified and verified caller.

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